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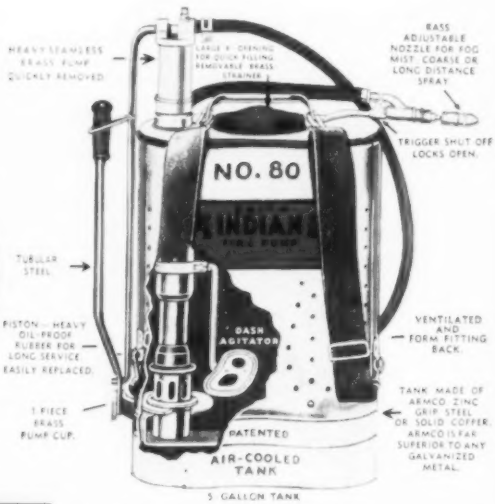
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Photo by Bluford W. Muir, courtesy U. S. Forest Service

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The Law and Progress In Conservation[1]

Samuel H. Ordway, Jr.

ONE OF THE first cases presented to students of the *law of property* at law school, in my day, related to wildlife. The case was that of Pierson against Post.[2] Mr. Pierson was a hunter. He shot a fox and wounded it to such an extent that the court found it would have died in a few hours. Mr Pierson was pursuing the blood trail through the woods when he came upon Mr. Post who had found the fox lying down and had seized it. Mr. Post refused to relinquish the fox to Mr. Pierson who claimed that, having shot it, and being in full pursuit, it belonged to him. The question before the court was: what constitutes *possession* of an animal "ferae naturae"—free by nature. In its wisdom, the court propounded the *doctrine* that "possession exists when the obstacles to manual seizure have become negligible." I do not recall who won out.

The Limitations of Law

This case is a good introduction to the vagaries of the law. In reading some of the more recent cases involving disputes over water under the appropriation system of the West and the riparian system in the East, we find, even today, a similar sort of equivocation.

Without law, disputes may well result in violence; and yet, law is not synonymous with order. We can only wish that by wise laws we could bring order to resource use. There can be quite as much conflict over what are wise laws as there can be over what is wise use of resources.

Even though the law of property has advanced far beyond principles such as that laid down in Pierson against Post, and become much more certain, the trend today is again in the other direction. Charles Haar of the Harvard Law School has stated the matter thus: "The law of property has taken on the characteristics, both advantageous and disadvantageous, of constitutional law. The trend is from relative certainty to what may be termed inchoateness, as the field of property has developed from one, technically called private law, into another, called public law. This change from a law primarily covering property relations between individuals to one in which the basic interests of society must be reconciled (such as the impact upon property of the exercise of the eminent domain and police powers) has important consequences. Precedent is weaker and predictability is reduced, replaced by the somewhat hazy field of constitutional generalities, of value judgments, and "countervailing forces."[3]

There are laymen who believe that laws can provide overall policy, or overall plans, to advance the conservation of resources. They object to the splinter approach. But even in the early days of our nation, De Tocqueville disparaged overall legislation when he said, "General ideas are no proof of the strength, but rather of the insufficiency of the human intellect; for there are in nature no beings exactly alike, no things precisely identical, no rules indiscriminately alike applicable to several objects at once."[4]

When there are substantive and substantial differences among men as to what is the wise use of resources, and when we consider the complexities involved in multiple use, we can recognize the difficulty in providing overall laws to govern resource development. This is why the law deals in principles such as that laid down in Pierson against Post, rather than seeking to settle finally issues which are seldom clearcut. This is also the reason why there is a considerable degree of speciousness in the thinking of those who believe that the law, if "properly enacted," could assure wise resource management. There is a vast difference between laws that seek to establish national or state policy and create administrative agencies to carry out the policy, and laws which seek to compel, or prohibit, or regulate the cutting of trees, or the number of trout that may be taken in a day, or the number of ducks of one kind or another that can be killed in a year. The problem is to achieve reasonable flexibility within sound policy.

Constitutional Law

There are, of course, many kinds of law, even as law has many purposes. Constitutional law deals with principle and authority, human rights and checks and balances. It is fundamental law in that it cannot be modified without extended process.

The Constitution of the United States, and its amendments, exist through ratification by the several states of federal powers, and ex-

THE AUTHOR is executive vice president of the Conservation Foundation, New York City.

[1] A paper delivered at the North American Wildlife Conference March 2nd, 1959.

[2] Pierson v. Post, 3 Caines (N.Y.) 175, 1805. (Correcting error in memory, Post shot and Pierson seized the fox!)

[3] *Boston University Law Review*, Volume XXXVI, Number 3, p. 333.

[4] Alexis De Tocqueville, *Democracy in America* 13 (Bradley edition 1946).

ecutive, legislative, and judicial functions, conceded by the states, with reservation to the states of powers not specifically granted to the federal government. It is the states that are united rather than all the people of the nation. It is interesting to speculate whether the best interests of our people are served by the present political and geographical boundaries of the states. If the people today were to determine new and ideal political and geographic boundaries of local unities which could still be united under a federal constitution, reserving to those unities local political, economic, and social powers, would we not have fewer states? And would not these new unities be based perhaps on river basins as a whole, with possibly a number of large metropolitan areas with common interests that today extend across existing state lines? I say it might be interesting to speculate on this because it is obvious that no such radical change in the Constitution is likely to occur until resource pressures significantly increase and become recognized as controlling economic and social factors in the future welfare of communities.

The economic and social influence of natural resources presented no significant problem to the states at the time the Constitution was first drafted; but times change, and resources do now present significant problems which we are seeking to solve, in part, through inter-state compacts, valley authorities, metropolitan councils, and other instruments of organization and law which are not inherent in the state-federal relationship so carefully defined by the drafters of our Constitution. As these pressures and problems increase through the years ahead, it is conceivable that the time will come when our lawmakers and our conservationists will be considering together the nature of long-range changes in constitutional thinking about the political status of unities such as river basins and metropolitan areas. Such unities may well become the bases of national representation and local government. We might even begin to ask ourselves *today* how sacred and how economically and socially essential are geographical and political boundaries which now constitute our 49 comparatively jealous and autonomous states.

Administrative Law

Administrative law is much more flexible than constitutional law. Administrative law and administrative procedures have grown up through the years, federally and locally, to meet convenience and expediency, and without consideration of interdependence. It is submitted that the resource problems that exist today in many jurisdictions require extensive revision of antiquated law and regulation. And yet we should not act too hastily.

Regulation of resource management, including wildlife, forest, range and wilderness management, habitat control, and watershed development is presently in an evolutionary stage. Even laws that seek to establish and define long-range policy remain controversial; and certainly there is little agreement about the best legislative provisions for governmental organization for resource management.

On this subject of organization there is the basic quarrel in almost all jurisdictions over the degree of centralization desirable for the administration of interdependent and interrelated resources. The advocates of centralization rightly say that separate departments, bureaus, and commissions dealing with specific resources become so concerned with their own specific problems that they lose sight of interdependence and multiple welfare. Opponents of centralization, backed by special interests, maintain that under centralized administration legitimate special interests will be neglected and valuable uses subordinated to the generality. Yet decentralized organization imports diversified legislative committees, diversified budget consideration and appropriations. This leads to duplication and conflict, extravagance, and delay.

A first-rate discussion of these problems can be found in William Schulz' book entitled *Conservation Law and Administration*,[5] which was a case study of law and resource administration in Pennsylvania. In the introduction he says:

> Integrated conservation planning that recognizes the unitary nature of the conservation problem is one of the vital contributions that law *can* make but one which is lacking under present legislation. At all levels of government in Pennsylvania, the management of water resources is treated as though it were only slightly related to the management of the grass and forest cover on the watershed, and as though it but slightly affected the management of fish and game. Yet even a novice in this field quickly comes to realize that, as a practical matter, every action with regard to one natural resource has an impact, delayed or immediate, upon every other natural resource. This principle should be the foundation upon which all legislation and administrative organization is constructed.

Professor Schulz appended to his book a generalized *model law* which has been used as a point of reference by legislative bodies and committees in a number of states, including Alaska.

The problem of the best form of government organization for unified *river valley* development, including construction of large and small structures to control the flow of rivers and their tributaries, the distribution of water and land-use practices in the uplands, is still largely unresolved. Interstate compacts are not rare, but they are difficult to effect and rarely effective because of the local jealousies involved and the sparing delegation of authority.

Creation of the Tennessee Valley Authority seems to be recognized today by many students as a highly successful approach to organization for resource development and the improvement of prosperity in an interstate river basin. Unfortunately, it aroused and continues to arouse anxiety and fear on the part of conservative forces in the nation who glorify local rights and conceive the Authority to be a dangerous anomaly under our constitutional system.

Few people comprehend the huge number of agencies and groups

[5] Wm. F. Schulz, *Conservation Law and Administration*, Ronald Press, N.Y. 1953.

concerned with one or another phase of water management affecting a great interstate river and its tributaries. For example, there are more than 263 local agencies vested with more or less responsibility for the management and use of the waters of the Delaware, and there are many federal agencies also concerned with that river. By centralizing authority, and centralization is necessary where multiple demands for water already exceed the supply, the responsibility of many agencies is bound to be curtailed. And that means trouble! In any legislative process which seeks to deal with so complicated a problem, compromise is inevitable. Even with compromise, something better than existed before may be achieved; but for optimum development and use of water throughout a basin, central authority is essential; compromise on this issue spells failure, the kind of failure we will not be able to afford in the long run. It is this fact which underlines the prospective need for change in our political and geographic unities which came into existence without consideration of the need for control of major water systems throughout the nation.

Antiquated Laws

Most laws related to resources are hardly adaptable to the pressure of modern demands. The law of water rights is a notable example. It is well known that in the United States two principal systems of water law have evolved. The doctrine of riparian rights, in the East, was largely a laissez faire doctrine which assured to the owner of private land "reasonable use" of the "natural flow" of streams on which his land bordered, and which percolated beneath his land. In an era of plenty this doctrine sufficed, with a minimum amount of litigation between individuals. As new uses and demands for water have increased through the years, including major public and industrial uses, the doctrine has become inadequate.

The law of allocation, in the West, is likewise becoming antiquated for the needs that now exist. Priorities under the Western law now have to be altered. The granting of permits and licenses has become an extremely technical function of governmental bodies, and rights previously acquired have now to be changed. A major problem in modernizing water law throughout the nation involves the subordination of existing rights of individuals to the public need, and the manner by which compensation for those rights can be provided. Another important problem is that of assuring the security of new investment in the private development of water. There is work here requiring collaboration between students of law, technologists, and conservationists.

Controversial Measures

Technical advisory services and financial incentives provided by law are new means of advancing development of watersheds, soil conservation, range management, and crop controls. All of these are controversial and influence conservation progress for better or worse.

There is much still to be done. Many of us believe that the present laws providing controls over the use of poisonous chemicals as insecticides are inadequate. Some interests would like to see modification of the Taylor Grazing Act. Others want to legislate sustained yield management of private as well as public forests. We are still fighting for the principle of wilderness preservation as a national policy; we need to speed up rehabilitation of the public range. Rules and regulations of our conservation agencies have the force of law. We still do not know how best to fix hunting and fishing times and limits; or regulate predation; or what should be the extent of air and water pollution control; or the limitation of billboards. In a very important opinion the Justices of the Supreme Court of Massachusetts recently extended the purview of the police power to include aesthetic values.[6] Recreation facilities have long since become inadequate, but how can we at this late date best acquire rights to land that will be needed for recreation and other conservation uses in the distant future? Few lawyers agree.

Since laws are made by representatives elected by the people, and since laws can be changed for better or worse, it remains important that the people be constantly aware of the implications of resource policy and of the manner by which it can be translated into action. Not only conservation, but the law of conservation is everybody's controversial business.

Land Use in the Welfare State

There are some souls who purport to believe that the use of private land should be publicly controlled in the interest of conservation. They do not consider what minds would be competent to exercise such control, or what assorted interests might thereby be excited to violence. The notion springs from increasing talk about exploitation, urban sprawl, regional plans, and land-use zoning. Too few of us appreciate that every control of private land use is a restriction of individual freedom.

Nevertheless, we do in fact find more and more restriction each year on the uses of private property as population and industrialization crowd the land. Too little thought is given to our growing need for recreation, for space and clean air and blue sky, without which Walt Whitman said "democracy will dwindle and pale."

Urban sprawl, that creator of megalopolis, now reaches across state lines and raises new problems of both law and government. Zoning under the police power is one legal tool invoked to meet the crisis. But the law is confused by the demands. Land-use planning, transportation, airports, water systems, power, factories, housing, schools, parks, recreation, all assert demands. How can we, in the face of sprawl, conserve resources and human rights and public welfare? Can new concepts of law evolve fast enough, and soundly, to meet these problems? Suffice it to say here, in the words of Charles Haar:

> Out of this restlessness and growth, the pressures of different interest groups,

[6] Opinion of the Justices (Mass.) 128 N.E. 2nd 557, 1955.

and retested experience will emerge, one may hope, a further rationalization of land law policies. Recognition that even the oak of property law bends in the wind does not necessarily identify change with progress. One group upon whom has fallen a major job of reconciling the diverse values and of achieving the most efficient allocation of land resources is the legal profession. The challenge is great and alluring: granted the need for city planning, how may reason be used in formulating policies; how may intelligence be applied in the choice of goals, means and priorities? How do we work out an organization of society both efficient and fair in dealing with property concepts?[7]

These questions too will be answered, if they can be answered at all, by lawyers, planners, and conservationists working together.

International Law

International Law and International Conventions have played a significant part in resource development and distribution. So, of course, do international trade and technical assistance, which are products of the legislative process.

Protection of wildfowl high over the borders through international conventions, and the conservation of fisheries on the high seas, while not perfect by any means, indicate that nations can and will cooperate for the welfare of all. The United Nations sponsored the first major international meeting of technicians concerned with all kinds of world resources — the UNSCCUR meeting in 1949. And the International Union for Conservation of Nature and Natural Resources is a more recent gesture toward common understanding and action which deserves far greater financial support from member nations.

I now submit to you an approach, through law, which seems to me to hold out an extraordinary hope for progress in world resources development and distribution, and indeed a hope for lasting peace in the framework of one world. It is based on the concept that through increasing world-wide recognition of the dependence of all men everywhere on the raw materials of earth for common survival, lies an incentive to international cooperation not found in political and ideological or power approaches, which seem today to block international agreements. As populations increase and industrialization spreads to less developed nations, and the demand for raw materials now exported by the latter increases at home, the struggles to possess adequate raw materials will either have to be resolved by International Treaties, to increase world production and productivity and equalize distribution for the common good, or they will be resolved by force in an age of atomic destruction.

The nations have not yet found a way in law to federate and become one world. This is somewhat strange in view of the knowledge of the values and potentialities of flexible constitutional procedures, and in view of the will of peoples to better human welfare. It is not love of the idea of sovereignty alone, or of racial or even religious chauvinism, that precludes progress toward one world. It is economic rather than political fear that holds the world apart.

What is at the root of economic fear, which perhaps the long experience of law can help resolve? I would suggest today that one of the roots of economic fear—and perhaps the most decisive taproot of all—is the unequal scarcities of natural resources which are essential to national prosperities. Each nation is dependent on *imports* of various vital resources, as well as on the resources it possesses itself, to maintain a minimal prosperity and safety. Here are roots of jealousy, as well as fear, that keep the boundaries of nations armed.

The search for greener pastures, the history of the bursting forth of have-not peoples (who failed to conserve what they had at home) to conquer and consume the resources of the more conservative "have peoples" (who may have become soft in their having) is constantly in the minds of leaders of nations where populations and consumption are growing fast, and scarcities increase. I submit that the disposition and indisposition of resources are at the root of economic and material fears that keep the world divided. Perhaps, then, a world treaty that would provide for a pooling of effort to attain optimum yields of all the world's resources, and flexible but optimum distribution thereof, may be a touchstone step in the direction of one world—and world-wide conservation.

This may seem a revolutionary idea. But is it any more impracticable than the early idea that 13 divergent and far separated colonies in America could ever pool their diversities, their ambitions, their animosities, and their resources for a more perfect union?

Let us look at the practicalities. It is stated by many authorities that even with three billion people in the world, there are sufficient mineral and organic resources recoverable annually from the earth and sea by use of technologies now practiced in some place or another, to raise the level of living of all men to a state of modest luxury. This is not to prate of Utopia—some men will always waste and some will hoard, and some will seek more than their share. It still takes law to police human conduct everywhere. The fact is that this world's resource *potential* is sufficient while its distribution system and its political system are wholly inadequate. The plentiful life can be obtained only by world pooling of the resources of the Earth under international law and one world organization for distribution under law. It is not that resources and their conservation are the supreme end in themselves—human values are the supreme end—it is that the incentive of plenty for all, through world union and world law, is a quite possible approach to unity in the world of tomorrow.

I have referred before to the difficulty of arriving at effective interstate compacts here at home to provide for the development and distribution of the multiple benefits that accrue from unified and centralized administration of great river valleys. Is there then any reason to believe that international rivalries, jealousies and chauvinism are more likely to be subordinated to the salvation of world welfare than are the jealousies of a few

[7] *Boston University Law Review*, supra, p. 336.

American states, counties, and municipalities anent a River Valley?

Strangely enough, I think the answer is "yes." There are factors of compulsion in the world scene which we do not have in the Delaware or the Columbia Basins. There is the "have not" factor, the inherent danger to the more prosperous ways of life from the desperation that grows with hunger and denial in crowded lands. There is no such dangerous compulsion inherent, as yet anyway, in our own basin disunities. And there is the factor of plain humanity.

It is easy enough to believe that some governments, some sects on earth, and even some races of men, have no respect for the individual and can never be moved by humanity—by which I mean: by a compelling sense of responsibility to improve the conditions of their own people and of people everywhere. Certainly the Union of Soviet Socialist Republics, and the Communist leaders of China are both very much concerned indeed with the health and the productivity and the satisfaction of their people. They may use what seem to us repressive and enslaving methods to accomplish what they are sure is going to be—indeed must be if the leaders are to survive—the betterment of their peoples' condition. We must not confuse methodologies with the will to human progress, which I believe exists everywhere despite the apparent frequency of repressions, crimes and pogroms. For all of man's cruelty to man—and we can find examples of that here at home—there continues to be a recurrent, irrepressible movement forward toward greater human welfare, a movement nurtured by all of the great philosophical and religious communions of mankind.

We are not going to have peace in our time, one world, through chauvinistic negotiations and approaches of the past, or through power politics and national vetoes. But we may open the doors to peace in our time through an interhuman need for a pooling of the resources of the earth, for their universal and common development, and their controlled distribution.

We have already made two starts. First, in the age-old system of barter: if you have something I need and I have something you need, we swap. This, with infinite economic and political complexities added, is international trade. The United States in the last 50 years has had to import more and more raw materials from other lands—and certainly with our growing population and industrial expansion we are going to want to import much more in the years ahead. We are going to give away in return much more of the wealth we can spare, and ultimately a lot that we will not like to spare. But would we not all agree that we would prefer to see our own prosperity somewhat lessened to avoid atomic warfare, and at the same time raise the levels of living of other men? Necessary trade is an approach to the pooling of resources.

Next, we have made a start by way of technical assistance. This assistance could be far greater if we did not have to assist ourselves and others to build up and maintain military force "as a deterrent to war." Technical assistance aims at better development and better productivity of natural resources, and at industrialization. If we can avoid the temptation to impose our own ideology and sometimes quite boorish foreign way of life, along with the gifts of technology, we are taking a long step down the road toward resource sufficiency for the many, instead of the few.

We should note, also, that it is not only the Western powers who are providing technical assistance toward resources development. The Russians also are embarked on technical and materials assistance programs, which of course provide reciprocal benefits to their own economy, and increase their trade, employment, and political kudos. In fact the idea of international cooperation to increase the agricultural, industrial, and technological production of less developed nations is accepted strategy and may well be turned, in course of time and necessity, into acceptable *international ideology* as it becomes a widely used economic and social (as well as political) practice of both camps.

The aim of such common ideology that could lead East and West together—toward one world—is to increase the availability of world resources and so to increase levels of living and *world* prosperity. With each increase in living levels anywhere, there is an increase in education, in trade, in research and technology which will raise standards elsewhere. The aim is to start and stimulate a peaceful cycle of prosperity. It is not a matter of price and wage inflation, but inflation of the resource base, and thus of human levels of living which in turn initiates an upward spiral of prosperity for all. To *fight* for resources that are scarce, and destroy them in the process, is a sorry alternative.

How might we progress now from these first steps that have been taken? An international law could be proposed—a convention to which any nation might subscribe. It could be accepted by East and West, the Arab nations, Indonesia and all neutrals too, because no one will be asked to give up ideology, or sovereignty, or territory, or anything they hold so dear. The law would call for a pooling of technical assistance programs under U.N. administration, with member contributions proportional to those made to the support of U.N. today. The law would create a constructive world partnership to raise production and productivity to a sustaining optimum, and to distribute the increased product from a pool, under formulae to be stated in the law and interpreted, if necessary, by the World Court.

Obviously it is the formulae for distribution of additional and surplus production that will be difficult to state acceptably to all. But formulae have been worked out for the distribution of water in many River Basins whether under a Master or an Authority, or a Commission, or the Supreme Court. A method is not beyond the ingenuity of men with a will to advance world welfare and peace. I think it can and will be done.

Of course any international law or treaty providing for distribution can be divisive as well as collective. Nations can seek to wreck the law. Tariffs can alter an entire distribution system. Imports of certain materials, raw or refined, from one or more geographically or politically foreign states can be discouraged, by making them too costly. Law can lock up certain resources in certain places and for better or worse make them unavailable. Surpluses can be bought by governments and either hoarded or bartered or given away for political and social purposes.

The people, through their representatives, can legislate prosperity or famine, free trade or prohibition, war but seldom peace, insularity or one world. But nations can also declare war and be done with humanity. I believe that an International Resources Law will be more collective than divisive.

I offer no blueprint here, nor am I suggesting a Utopia. I repeat only that resources and law together provide an approach, an incentive approach, a comparatively painless next-step approach to world conservation progress and toward one world as well. The common dependence of all men on natural resources which, mutually developed, can support a favorable way of life for the many, offers a reasonable *hope* of achieving peace in our time.

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Minnesota Forests Surveyed

Minnesota forests are changing rapidly, according to a report by the U. S. Forest Service Lake States Forest Experiment Station.

The new report, "Minnesota's Forest Resources," compares the results of two forest surveys, one made in the mid-thirties and one in the early fifties, and analyzes the current status of the forests. It presents the results of the first comprehensive inventory of Minnesota's timber resource made since 1936.

Originally forests covered 31½ million acres in Minnesota. In 1953 they covered 19⅓ million acres or 38 percent of the land area.

In many ways the forest situation has improved in the past several decades. Substantial progress has been made in fire protection. Forest management practices have shown steady improvement. Ownership of forest land is more stable.

Since 1936 the forest area supporting stands of 3 or more cords per acre has increased 23 percent (from 5.9 million acres to 7.3 million acres). Sawtimber volume has expanded 11 percent despite the heavy cutting of the war and postwar years. Annual growth, both in softwoods and in hardwoods, has increased 38 percent. The increase in growing stock and in growth the report points out was partly due to large areas of sapling stands which reached pole size during this period.

The resource situation has deteriorated in some respects since 1936 in that the area of coniferous forests has decreased and the area of nonstocked timber land has increased. The acreage of merchantable timber of softwood types is less now than in 1936. On the other hand, the acreage and volume of hardwood timber of merchantable size has increased considerably. Seedling and sapling stands have thickened up.

The report indicates that about 247 million cubic feet should be cut annually in Minnesota, but in 1952 only 154 million cubic feet were cut. However, much of the present surplus timber is tamarack, cedar, aspen, and low-quality hardwoods. More timber cutting is needed to utilize this material. Where surpluses of white pine, spruce, fir, and the better hardwoods do exist, they are mostly in sparse, inaccessible stands or in other situations where logging will be costly.

Minnesota's forests should eventually be capable of yielding three times the 1952 cut of timber, according to the report. Intensive management will be required to increase growth rates and reduce losses. Planting must be done to restore softwoods.

The survey upon which this publication reports was made by the Station in cooperation with a large number of public agencies and private companies. The Office of Iron Range Resources and Rehabilitation did the field work on most of the private lands while the State Division of Forestry, the national forests, and the Bureau of Indian Affairs furnished data for lands under their management.

Copies of the report may be obtained by writing for Forest Resource Report No. 13 at the Lake States Forest Experiment Station, University of Minnesota, St. Paul Campus, St. Paul 1, Minn.

Experimental Woodlands as a Means of Encouraging Improved Management of Small Tracts

John Aughanbaugh

THE MOST URGENT forestry need in Ohio is proper timber culture in frequently neglected farmwoods. Those woodlands attached to farms, some three million acres of them, comprise 56.7 percent of the commercial forest land in the Buckeye State (*7*). So presumably Ohio, blessed with highly developed farmland, might produce all of its needed hardwood timber mainly as a farm crop. Actually, any home-grown sawtimber of good quality, although in steady demand, invariably is in short supply and proportionately high-priced.

Why the existing situation? Partly at least because so few farmwoods owners consider the timber to be an important asset. Repeated woods-grazing, over-cutting, high-grading, or other abusive practices have resulted in woodlands which are stocked heavily with decadent or worthless weed, wolf, and cull trees. A recent survey (*7*) reveals that 80 percent of the state's net board foot growth is in grade 3 logs, the lumber value of which hardly justifies cost of handling. One of every five or six sawlog-size trees is a cull (*9*) standing in the way of efficient timber production.

Noted for the choice cabinet and other fine hardwoods it formerly exported, Ohio today must import 85 percent of the wood processed by its manufacturing industries (*5, 9*). Obviously, its farmwoods require frequent improvement cuts which are planned so as to rebuild a satisfactory growing-stock before prime hardwood sawlogs can again be produced at top capacity.

Once a forest's stand structure has deteriorated, it requires years of constructive effort to reach the volume of cut that can be sustained. Nevertheless, if given attention and proper care, Ohio's readily accessible and potentially productive farmwoods would return profits enough to be significant in the farm program. This writer believes that well-tended wooded acres together with fertile fields and pastures help to promote better living standards on more self-sufficient farms.

Forestry on the farm, or intelligent farmwoods management for profit, ought to play an increasingly important role in the agricultural and industrial economy of so prosperous a state as Ohio. As Preston (*10*) aptly says: "The growing of wood as a farm crop, a woodland enterprise as part of the farm business, is a conception that has had a long struggle for recognition."

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Experimental Forests

Cognizant of these state-wide problems of long standing, the Forestry Department at Ohio's Agricultural Experiment Station initiated in 1945 a long-range research program of experimental forests to be managed intensively with continuous inventory. It was proposed then to place one or more such forestry study centers within each of Ohio's 88 counties (*3, 4*).

Today a network of 28 experimental woodlands of 15 to 80 acres each is established, mostly in the eastern half of the state. Some exist on public property and the others are privately owned. All are representative of local conditions with regard to acreage or character of the standing timber.

The study tracts contain an average of one circular, fifth-acre permanent sample plot per acre, spaced evenly within each woodland. Recurrent measurements of the paint-numbered trees on those plots are taken at one to five-year intervals, to gauge the interim growth, ingrowth, mortality, and cut attributable to the various species. Individual trees are evaluated by their breast-high diameter, marketable sawlog length, grade, crown class, and vigor. Timber quality is based upon a 16-foot buttlog tree-grade system in accordance with Purdue standards. Defect deduction factors, applied to sawtimber-size trees (d.b.h. 11.0 +), determine net board foot volumes in terms of the International $\frac{1}{4}$-inch log rule. Standing trees of no present or future value, considered "culls," are not tallied. In all, factual records are being kept for approximately 25,000 different numbered trees.

To build up the productive capacity of these research-demonstration woods, experiment station foresters rely on the single-tree selection system of silviculture. Their management goal is for each owner to grow continuously the most of the best timber suited to given sites. Another objective is to find what growth rates, economic returns, or indirect benefits actually do result from good cultural practices. Moreover, the experimental woodlands demonstrate on-the-ground timber cropping procedures and results to interested woodland owners, sawmill operators, and the general public.

During re-inventory times, while the growth records at hand serve as guides, enough mature, slow-growing, and unsound timber can be marked to provide operable cuts for the landowner. Thereby selective treatment points the way to a better stand, faster growth, and greater future profits. Light and frequent improvement cuttings gradually remove the low-grade trees, including those too defective, deformed, or over-mature to make good growing stock. Owner-cooperators who follow our management program will cut, girdle, or poison such unwanted trees when marked for removal.

TABLE 1.—ORIGINAL STAND IN 1946 AS COMPARED TO LATER INVENTORIES ON A PER ACRE BASIS

Year	Interim gr. seasons	Trees	Basal area	Cut	Mortality	Ingrowth	Growth	Net Volume
	Yrs.	*No.*[1]	*Sq. ft.*			*Bd. ft.*[2]		
				Sanor Woods				
1946		32.0	81	—	—	—	—	6,485
1953	6	32.5	83	1,273	—	350	1,598	7,160
1956	3	34.4	83	1,366	—	461	1,270	7,525
				Whitford Woods				
1946		34.0	65	—	—	—	—	4,454
1952	5	40.4	73	82	11	371	853	5,585
1957	6	48.7	84	201	40	647	2,299	8,290

[1]Sawtimber trees 11.0 inches d.b.h. and over.
[2]International ¼ inch log rule. Defect deduction factors, for each tree, gave net volumes.

Record accounts of the wood products removed, the values of those used and sold, and the expenses incurred in harvesting them are a necessity in farmwoods management. Without records, few forest owners are aware of the profits to be made from timber growing.

Typical Examples

Our study tracks are now paying off with reliable information on what to expect from a well-managed small woodland. It is a timely subject that today is receiving nation-wide attention from foresters.

This article summarizes the data assembled to date from two of Ohio's typical experimental farmwoods. They are the Sanor Woods (No. 11) in Columbiana County and the Whitford Woods (No. 10) in Geauga County. Both are located within the glaciated portion of northeastern Ohio. Set up as study areas during 1946, they now have had 13 growing-seasons under experiment station supervision. (Table 1)

These two farm forests possess various features in common. They are essentially all-age beech-maple stands, and each has belonged to one farm family for generations. Both tracts are sugar bushes but tended for the dual purpose of harvesting maple syrup and wood products. Fenced to exclude livestock, they exhibit a fine undergrowth of young trees.

Yearly or frequent periodic cuts of timber provide the owners or their tenant farmers with home-use building materials, fence posts, fuel, and firewood at their sugar houses. High-grade processed products are marketed, the woods work being done with farm labor and equipment. They cut only about the amount of annual growth, thus insuring a continuing timber harvest. Top quality trees are left to mature. It has taken years of painstaking care to make them productive and attractive farmwoods.

FIG. 1.—The Sanor tracts is a well-managed farm woodland.

The Sanor Woods

Outstanding among our showplace woodlands is the Sanor tract. (Fig. 1) It ranks as Ohio's Tree Farm No. 6, and Experimental Woods No. 11. Anyone walking through this forest is impressed by the fact that every tree is a good tree.

Forestry Department Chairman Oliver Diller, who keeps in close touch with Ohio's forest betterment program, says this about the Sanor Woods (*6*): "The Sanors are excellent cooperators on our experimental forest project. Just a few days ago they sent us their annual detailed statement for the period September 1, 1954 to September 1, 1955, containing accurate data on the number of man-hours of labor expended in cutting, skidding, and hauling logs; the number of chain-saw hours for all operations; number of miles of truck hauling; number of man-hours spent making and hauling cordwood; number of hours spent tapping maple trees, hauling sap, boiling sap, cleaning the evaporator, etc. On the other side of the ledger they keep an accurate record of the farm use and sales of woodland products.

"An itemized record of returns for the period 1931-1938 which appeared in the September 1948 issue of the Ohio Forestry Association News Bulletin plus additional records since then, show that this 20-acre tract has yielded over 100,000 board feet of logs and over 700 gallons of maple syrup during the past 24 years. During certain years cutting exceeded growth in order to take advantage of good markets, but in general, the growing-stock

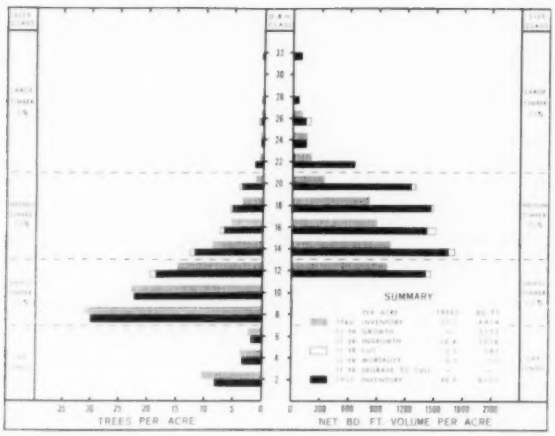

FIG. 2.—Growing stock in Sanor's woods, Columbiana County, Ohio. 1946-1956.

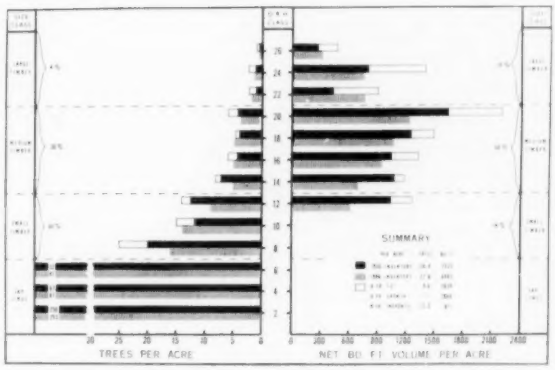

FIG. 3.—Growing stock in Whitford woods, Geauga County, Ohio, 1946-1957.

has been maintained in a continuously productive condition. In addition, they obtained many cords of fuelwood for home use and for maple syrup production.

"The records show that the Sanors earned $2.50 per hour for their labor in 1947 and $2.76 in 1948. Over the years they have taken in an average annual gross income per acre of at least $10, and it is estimated that at least half of this can be considered as net income."

Those earnings reflect the Sanors' proper methods of harvesting, utilizing, and marketing their forest products. They do partial or selective cutting annually, to assist crop trees and to thin overly dense saplings. In the large timber class (d.b.h. 21.0+) only the most vigorous trees increasing rapidly in value are retained. Stumps are invariably cut low. Felled trees are bucked into the best possible products for which a market is ready or can be found. Prime, select sawlogs go to specialty buyers, often but not always for container veneer.

Unused tops of felled trees never clutter the ground in their woods, and natural mortality is practically nil. In marking for cutting, the poorest trees are taken first. Few cull, weed, or wolf trees, nor any poor-risk sawtimber remain. There exists an excellent balance between cut and growth (*1*).

As is graphically shown in Figure 2, this forest's stand structure by size-classes, from seedlings to mature trees, is of well-proportioned distribution and in fact approaches full or ideal stocking condition. Its growth rate has steadily increased due to sound silvicultural practices. During the period 1946-1956, the Sanor Woods' yearly per acre increment amounted to 318 net board feet (4.9 percent), plus an ingrowth of 90 additional board feet. By combining the cut and growth, its overall annual per acre production totaled 612 net board feet., or 9.4 percent figured as simple interest.

Long-continued efforts at stand improvement with opportune usage of the felled trees have repaid these enterprising farmers with larger and more profitable harvest cuts of high-grade timber.

The Whitford Woods

This 47-acre tract is another very promising farmwoods with a thrifty growing-stock (*2*). Table 2 gives its forest composition and specific growth rates. Just as good dairy farmers keep individual records on their cows, alert farmwoods managers wish to know which tree species are topnotch producers, also which are inferior.

Tree heights and stand density indicate the Whitford Woods to be a better than average timber growing site. Its soil type—Wooster silt loam—derived from glacial till, is of moderately high productivity.

Figure 3 shows the timber to have almost doubled in volume, while its quality rating probably more than doubled during 11 growing seasons. Sawtimber stocking per acre went from 4,454 to 8,290 board feet net (after deductions for defect). Such per acre increase represents a growth rate, i.e., an interest return on the forest capital or growing-stock of 287 net board feet (6.4 percent yearly)—a substantial contribution to the farm income. Current growth is being largely confined to sound, cleanboled trees with ample room to develop rapidly, thereby advancing the earning capacity of the forest. Butt-logs contain considerable grade 1 and 2 wood, which is preferred for veneer, cooperage, handle stock, or manufacture into quality lumber.

Saplings alone are relatively scarce, due partly to the dense overstory. Furthermore, it has become a common though misguided practice in the sugar bush to cut back any "brush" hindering sap collection. It requires an opening up of the overhead canopy, such as resulted from a recent improvement cut, to encourage additional reproduction.

The forest stocking by size-classes (Fig. 3) shows a well-balanced pattern of development, except for saplings and mature trees. Its distribution is: (1) small timber (7 to

TABLE 2.—COMPARATIVE GROWTH BY SPECIES IN WHITFORD WOODS
(Data on per acre basis)

Tree species	Trees of sawlog size			Net volume[1]			Periodic annual growth			
							Per tree		Per species	
		No.			*Bd. ft.*		*Bd. ft.*		*Percent*	
	1946	1952	1957	1946	1952	1957	1946-1952	1952-1957	1946-1952	1952-1957
Sugar maple	13.7	15.6	17.8	2,061	2,364	3,284	2.9	7.5	2.2	5.7
Beech	5.0	6.1	6.5	499	680	888	3.8	6.2	4.8	7.4
Red oak	4.4	4.8	5.5	612	832	1,351	7.7	14.8	6.1	10.4
White ash	2.6	3.1	4.6	227	322	586	4.4	6.4	6.2	9.5
Elm	2.9	2.9	3.3	219	258	391	3.0	5.2	4.4	7.0
Tuliptree	2.3	2.3	2.5	401	510	738	9.4	13.8	5.4	6.9
Red maple	1.5	2.1	3.5	161	244	427	4.5	5.0	5.8	7.0
Hickory	1.5	2.0	3.1	116	175	312	3.0	4.0	5.2	7.0
Basswood	0.6	0.6	0.6	92	108	136	5.3	7.7	3.5	4.3
Others[2]	0.6	0.9	1.4	66	92	177	3.3	8.5	4.5	14.4
Total	35.1	40.4	48.8	4,454	5,585	8,290	4.2	7.9	3.9	6.9

[1]Defect deduction factors, for each tree, gave net volumes. Trees scaled by International ¼-inch long rule.
[2]Black cherry, white oak, yellow birch, butternut, cucumbertree, large-tooth aspen.

12 inches d.b.h.)—71 percent of trees, 17 percent of volume; (2) medium timber (13 to 20 inches d.b.h.)—27 percent of trees, 70 percent of volume; and (3) large timber (21 to 32 inches d.b.h.)—2 percent of trees, 13 percent of volume.

Often foresters rely on a stand basal area analysis as being more meaningful. The basal area of 84 square feet per acre is apportioned thus: saplings 2 percent, small timber 45 percent, medium 46 percent, and large 7 percent.

Yearly ingrowth of trees to sawtimber size amounted to 92 net board feet to the acre. Considering an annual per acre cut of only 26 board feet, a mortality of less than 5, and degrade to cull nil, obviously the consumption and natural loss combined offset but little of the accumulated increment. It left a big margin for stand buildup to optimum stocking, after which the equivalent of current growth can be harvested on a sustained yield or continuous cropping basis.

Though a relatively young stand with little commercial output to date, the Whitford Woods will supply steadily increasing sawlog cuts during the years to come.

Object Lessons

These progressive Ohio farmers have found timber to be worthwhile as a farm crop. Their farm programs include some definite plans for timber culture. They make the farmwoods yield, as it should, a substantial, dependable part of their yearly cash income.

Foresters have repeatedly stressed the importance of farm woodlands to our national economy. But any forestry to be practiced in Ohio's farmwoods depends, in this writer's opinion, more on the profit motive than on indirect or intangible benefits. It is up to foresters to point the way.

Not only have these particular farm forests become sources of pride and satisfaction to their owners, they serve also as valuable object lessons for others. Nothing fosters success so much as profitable local examples.

Some foresters think the only way of inducing small woodland owners to practice forestry is to offer large subsidies through ACP payments, reduced taxes, long term loans, and free advice. Others believe that if research and education can demonstrate that intensively managed small tracts are profitable, timber owners will become interested enough to give forestry a trial.

There is probably no single means of getting more and better production from Ohio's small woodlands. It is apparent, though, that research-demonstration tracts which show the potentialities of timber culture can be used effectively to persuade many an Ohioan to practice good forest management. Such tracts provide an excellent opportunity for integrating forest research, education, and action programs.

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Observations on Growing Douglas-Fir Planting Stock in Small Intraforest Nurseries

Charles K. Peck, Joseph Strach, and Robert J. Stekiel

MEN who practice forestry on their own lands often wish to grow their own planting stock. Usually this desire comes from the need of growing speciality stock or from a keen interest in watching a forest grow from seed to tree. But when costs, equipment, and management of production in large nursery layouts are investigated these factors loom so large that producing home grown planting stock is rarely a part of a farm forestry program.

During the late winter of 1956 plans were made to investigate the practicability of producing home grown Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) planting stock in small intraforest nurseries. These plans were based on Joseph Strach's experience in Poland where he was a forest supervisor prior to his capture in World War II by the Russians, his subsequent escape, and emigration to the United States.

Reforestation practices in Poland, according to Strach, seldom included permanent, large forest tree nurseries as are commonly utilized in the United States. Usually the Polish nurseries were temporary and small, used from two to four years and having from 1,000 to 15,000 square feet in seed beds.

These small, temporary nurseries were located close to areas to be planted within two years; their size dependent upon the amount of stock necessary. Such nurseries were regarded as essential tools in the Polish system of intensive forest management. Foresters considered it basic that plantations be established by seedlings grown in nurseries developed in the immediate locality of the plantation.

Location in proximity to the anticipated plantation was not the only consideration. Site selection to obtain normal germination and proper growth of the seedlings was also of major importance.

Keeping these factors in mind, the forester looked for level or gently sloping ground to west and north, having deep, fertile, well-drained soil of good texture on which to establish his nursery.

Of equal importance to soil requirements was location of the nursery adjacent to overwood which threw shadows over the seed beds during portions of the critical plant-stress time of day in the summer months. This forest shade, promoting lower soil temperatures, was thought to create an ideal microclimate for the production of certain planting stock, gaining somewhat the same effect as sprinkle-irrigating or lath-shading fully exposed seed beds. The forester was careful not to locate his nursery within the root influence zone of the sheltering overwood.

First Attempt Unsuccessful

To try Strach's plan, two nursery sites in Cowlitz County, Washington were selected: one on the Floyd Givens' farm, Paine Road, Silver Lake; the other on the Peter Peters' farm, Abernathy Creek.

On both farms exceptionally good sites were found. Each had clearcut areas sheltered on their western boundaries by dense-grow-

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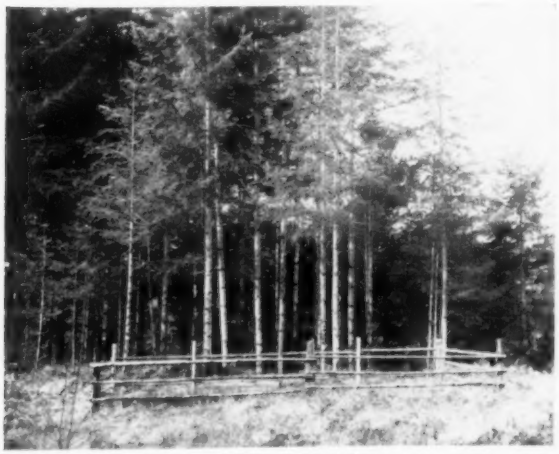

FIG. 1.—Intraforest nursery established on farm property in Washington for home grown seedlings. Fenced with poles from the stand in the background, this nursery is placed to take advantage of afternoon shade from the overwood. Camera facing west. Dominant trees about 50 feet in height.
Cowlitz (County) Extension Photo

FIG. 2.—Douglas-fir planting stock raised in the nursery shown in Figure 1. Photo taken in February, 1958. Foreground seedlings from treated seed sown in March, 1957. Tall ones in background are 1956 transplants.
Cowlitz Extension Photo

ing Douglas-fir of about 30 years of age (Fig. 1). This gave full exposure to the east and the morning sun. The forest on the west was counted on to produce cooling shade after the sun had reached its zenith and started declining in the afternoon.

A 15 by 30 foot nursery was staked out on each of these locations, their longer axes running very nearly true north and south. The western side of each nursery was about 6 feet from the average drip line of the trees.

During March, 1956, the nurseries were prepared for seeding. All herbaceous growth and litter was cleaned from the sites and they were spaded to a depth of 10 inches. The soil was Olympic Silty Clay Loam. After spading, the nurseries were raked smooth. A fence was built around each to keep straying livestock from trampling.

On April 7, 1956, four seed beds were prepared in each nursery. Drills were struck across the beds perpendicular to their lengths and spaced 5 inches apart. Douglas-fir seed, purchased from a commercial forest seed tree company, was sown in the drills and covered to a depth of about ¼ inch. One pound of seed, showing 30 percent germination and poor energy after 12 days of wet blotter test at room temperature, was sown in each nursery.

These trials were failures. Hardly had the seed been sown when "mice" and/or other animals began to find them. Soon, much of the seed in both nurseries was devoured. A few rows were missed, but when the seedlings sprouted, cutworms (not positively identified) destroyed most of them. Twenty two seedlings were raised in the Givens' nursery. The Peters' nursery raised about 300.

A Second Trial

As Cowlitz County had an excellent Douglas-fir cone crop in the fall of 1956, local seed was collected to repeat these small nursery tests. After extracting and cleaning, the seed was placed in cloth bags and stored through the winter at O°F.

The few 1956 seedlings growing in the nurseries were transplanted during March, 1957, concentrating them in a section of their respective nurseries. The rest of the nurseries beds were respaded and laid out in their original positions.

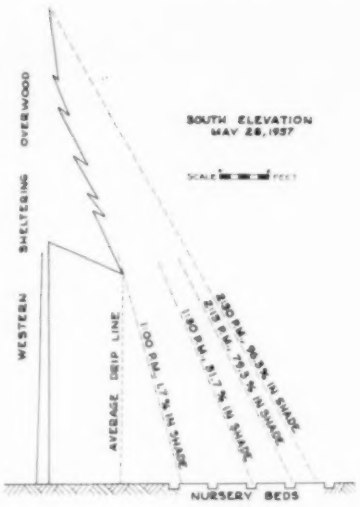

FIG. 3.—Generalized movement of afternoon overwood shade over Peters' nursery, May 28, 1957.

In the meantime, seed for the 1957 tests was taken from cold storage and soaked for 30 hours at room temperature (70°F). After this soaking period, all excess water was drained from the seed, leaving it only slightly damp. The seed was then placed in plastic bags and stored at 35°F until date of planting. (This final processing period should be from three to six weeks duration.)

On March 26, 1957, the seed was treated with a rodent repellent and with a fungicide.[1] The Dow Latex No. 512R—50 percent wettable Endrin powder—Arasan 75—formulation as described by the U. S. Fish and Wildlife Service was used.[2]

The Peters nursery was seeded March 27, 1957, with the processed-treated seed. The Givens' nursery was seeded April 2, using seed from the same seed lot as went into the Peters' nursery. This seed was sown at the rate of one pound for each nursery. Cheese cloth was suspended over the beds to keep birds away; excepting for a 3 × 10 foot bed space in each nursery left uncovered for comparison.

As April, 1957 was a rather cool month, germination was not observed until the first week in May. Emergence was apparently complete by May 18, resulting in an excellent stand in both nurseries. After the seedlings started to appear, a close check was kept for cutworm damage. None was observed, though several of these caterpillars were found in the Peters' nursery. Nor was any damping-off of seedlings observed. Apparently, the Endrin-Arasan 75 formulation has insecticidal as well as fungicidal value.[3] No difference was found as far as bird damage was concerned between the cheese cloth-covered beds and the beds left open. Both the open and the cheese cloth-covered beds remained free from damage.

Of greater importance, however, was the absence of rodent damage. None was observed in either nursery even though the local "mouse" population cycle was thought to be reaching the apex of its curve, culminating during the winter of 1957. In these observations, the use of the Endrin-Arsan 75 formulation apparently eliminated the rodent-destruction problem.

The nurseries were hand weeded on May 28 while weeds were small. No disturbance of the seedlings resulted. On this date, all cheese cloth was removed.

On May 28, a clear, warm day, afternoon overwood shadow movement was recorded periodically at the Peters nursery. Figure 3 indicates the relative position between overwood and nursery site and resultant shading.

The nurseries received a second hand weeding on June 24. Shortly thereafter, the weeding problem was discussed with Forrest Deffenbacher[4] who described the use of Stoddard's Solvent[5] in keeping weeds under control.

[1]The authors acknowledge with thanks advice and assistance from Homer Ward, nursery supervisor, Department of Natural Resources, Olympia, Wash.

[2]Formulation for the treatment of coniferous tree seed. U. S. Fish and Wildlife Service, Wildlife Research Laboratory, Denver, Colo. 1957.

[3]Op. cit.

[4]Nurseryman, Wind River Nursery, U. S. Forest Service, Carson, Wash.

[5]A Naphtha having a flash point of 101°F. and an aromatic content of 16%.

According to Deffenbacher, Stoddard's Solvent could be fogged on Douglas-fir seed beds to control weeds before seedling germinate. This material could also be used as a spray to control weeds throughout the remainder of the growing season; but only after the seedlings had set on their second whirl of needles.

On August 24, after a lapse of about six weeks, the nurseries were inspected. Weeds had almost taken them, particularly sheep sorrell (*Rumex acetosella* L.) and several grasses including annual bluegrass (*Poa annua*), colonial bent grass (*Agrostis tenuis*), and velvet grass (*Holcus lanatus*). One gallon of Stoddard's solvent was fogged over each nursery, completely covering both the seedlings and the weeds. A three-gallon garden pressure-type sprayer, equipped with a conventional cone nozzle, was used. The spray nozzle was held to a height of about 16 inches above the beds, permitting only atomized droplets to contact the plants.

The sheep sorrell wilted completely almost immediately after application. A few days later most of the grasses had disappeared. Damage to the Douglas-fir seedlings was not observed.

Observations made locally indicate that intraforest nurseries, growing Douglas-fir stock, can be kept free from most weeds by planned fogging with a naphtha of the same composition as Stoddard's Solvent. It is stressed however, that application must not be made on seedlings until after they have set their second whirl of needles, usually about six weeks after emergence.

Stoddard's Solvent is a commercial dry-cleaning solvent. It is sold by most filling stations under the brand name of individual oil companies. However, before using a brand name solvent, one should contact a representative of the oil company and determine if its product is of the same composition as Stoddard's. Usually one will find it difficult to buy Stoddard's Solvent by name, as it is licensed to be sold to the dry-cleaning trade.

Both of the 1957 nursery demonstrations were considered successful. The seedlings went through the unusually droughty and warm summer without any noticeable stress or mortality. The nurseries received no artificially applied water. In February, 1958 it was estimated that the Givens' nursery was growing 8,000 seedlings, the Peters' nursery 12,000. The discrepancy of 4,000 seedlings was largely caused by reworking one complete bed in the Givens' nursery to make space for autumn, 1957 seeding studies. The seedlings in both nurseries appeared to be healthy, with well-developed crowns and root systems.

Summary

In two tests made in Cowlitz County, Washington, small intraforest nurseries produced excellent Douglas-fir planting stock when certain biotic controls were used.

A first trial in 1956 with untreated seed on sites located in or near the habitat of animals and other pests feeding on seeds, and on seedlings shortly after emergence, were failures. When these nurseries were reseeded with seed treated with Dow Latex No. 512R Endrin-Arasan 75 formulation an excellent stand resulted. Throughout the 1957 growing season mortality from fungus diseases, chiefly damping off, was not noticeable.

Proper seed storage and processing before sowing seems to be a second important intraforest nursery practice. Local observations indicate that the "0°F storage—soaking at room temperature — 35°F damp storage" conditioning method gave good results. Using this method, the operator can gather local viable Douglas-fir seed in the fall and sow in the spring with the expectation of adequate germination.

Planned fogging with a naphtha of the same composition as Stoddard's Solvent gave good control of most weeds. Hand weeding proved to be the most laborous and time consuming chore of these tests. Quick, effective and cheap weed control by periodic use of this solvent material promises practical value of local intraforest nurseries.

If intraforest nurseries are located in correct proximity to western sheltering overwood, these observations indicate that Douglas-fir planting stock can be grown effectively from seed without irrigation or artificial shading. Seed sown during the spring of 1957 produced excellent stands. These came through the unusually warm and dry summers of 1957 and 1958, without visible stress or mortality due to high soil temperatures or lack of moisture. Seed beds received no artificially applied water; nor were they shaded artificially at any time.

Comparison of Pine Species on Florida Sandhills

R. L. Scheer

TWO MAIN PROBLEMS are involved in regenerating pine on the two million acres of sandhills in West Florida. The first of these, the development of methods for removing or destroying the existing cover, chiefly wiregrass (*Aristida stricta* Michx.) and scrub oaks (*Quercus laevis* Walt. and *Q. incana* Bart.), has been discussed elsewhere (*2, 3, 6, 10, 11,12*). Early results are now being obtained from attacks on the second problem, determination of the most suitable pines for planting on prepared sandhill sites.

Comparisons of pine species were begun shortly after the establishment of the Chipola Experimental Forest[1] near Clarksville, Florida, in 1952. The most rigorous of these was established in January 1954 near Bristol, Florida, on sandhills land owned by the St. Joe Paper Company, which was then beginning a large-scale site preparation and planting program. The Company provided about 60 acres of prepared land plus labor, machines, and planting stock for this cooperative experiment.

Species

Five species were tested—longleaf, slash, loblolly, shortleaf, and Monterey pines. Sand pine could not be included because planting stock was unavailable.

Longleaf (*Pinus palustris* Mill.) is the only pine that grows naturally throughout the sandhills. It once occurred in extensive and fairly good stands, but only a few scattered, flat-topped residuals are left —poor stuff for seed trees. The species will nonetheless be highly desirable for reforesting the sandhills, if the problems of low survival of planted trees, delayed height growth, and susceptibility to brown-spot needle blight can be overcome. Longleaf is the most fire tolerant of the southern pines, produces the best poles and sawlogs, and shows rapid growth and high disease resistance after starting height growth. Evidence of very satisfactory survival and growth in the study area is found in small, scattered, well-stocked natural stands that seeded in on old fields (*7*).

Slash pine (*Pinus elliottii* Engelm.), which grows in flats and better soils in west Florida has, with improved fire protection, invaded some sandhills land (*1*). The few, small plantations that exist on prepared sites in west Florida's deep sands have performed very well (*2, 7*), though their potential can only be guessed at.

Loblolly pine (*Pinus taeda* L.) occurs naturally within a few miles of the sandhills. Experimental plantings on denuded deep sands on the old Choctawhatchee National Forest (now Eglin Air Force Base) produced pole-sized timber in 17 years.

Shortleaf pine (*Pinus echinata* Mill.) also grows naturally within a few miles of the sandhills. Although no records exist of previous tests on deep sand in Florida, it grows successfully on dry sites elsewhere (*4*).

Monterey pine (*Pinus radiata* D. Don), a native of California, has produced almost unbelievable growth in the Southern Hemisphere. Stoate, for example, reported a plantation in Australia with a "maximum height of 130 feet and girth of six feet in 27 years" (*9*). The temptation to try to duplicate such growth on certain sites in the United States, without due regard for the requirements of the species, has sometimes been too strong to resist. Perhaps the most extensive venture of this nature was carried out in west Florida by a large industrial landowner. Over a period of four years, beginning in 1953, more than 5,000 acres of sandhills were mechanically cleared of all vegetation and planted to Monterey pine produced at the industry's nursery. All of the plantings failed rapidly and completely. The entire area has since been replanted with slash pine.

The Study Area

The study site was prepared essentially by pushing all vegetation into windrows 140 feet apart on

FIG. 1.—Typical west Florida sandhills site.

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[1]The Chipola Experimental Forest is part of the East Gulfcoast Research Center, which is maintained cooperatively by the Southern Forest Experiment Station and the Florida Board of Forestry.

FIG. 2.—*Left*: the study area ready for planting. *Right*: the rootrake-scalper used in clearing the study area.

centers with a rootrake-scalper (Figs. 1 and 2). Next the remaining roots were cut with a large tractor-drawn blade pulled horizontally through the soil at a depth of 4 to 6 inches. A heavy disk harrow mounted behind the blade cut up and exposed the roots. Any living roots left in the soil were allowed to sprout, and the site was then redisked.

The study was installed on two blocks, each with 10 fully randomized plots. This design permitted comparisons between the five pine species planted by hand and by machine. Machine-planting of shortleaf had to be omitted because of lack of stock.

The windows served as boundaries between the plots which were about 126 feet wide and 875 feet long, and contained about 2.5 acres each. Pine seedlings were planted on a 7- by 7-foot spacing. This required 2,250 seedlings per plot—18 rows containing 125 seedlings each.

To study early survival and growth of each species, records were kept on three mechanically spaced groups of 49 seedlings in each plot. Measurements were made at the end of each growing season.

Survival and Early Growth

The first measure of the performance of a species is its ability to survive. In this respect, slash, loblolly, and shortleaf pines have been outstanding (Table 1). Not only were their first-year survivals excellent, but they have held up very well through the three subsequent growing seasons. Longleaf pine survived poorly the first year and has shown a small but steady loss each year therafter. Monterey pine suffered such drastic mortality each year that it had very nearly disappeared by the end of the fourth growing season.

In early height growth, slash pine has so far been superior to loblolly and shortleaf. As Figure 3 shows, the latter two species grew nearly as well as slash pine during the first two years but then fell behind. By the end of the fourth growing season, slash was significantly taller than loblolly at the five-percent level.

Little can be said yet about the growth of longleaf pine. Although 76 percent had started out of the "grass" stage by the end of the fourth growing season, their average height was only one foot (Fig. 3). This average probably will increase rapidly during the next several years.

Figure 3 indicates that Monterey pine made no height growth after the second growing season. The few surviving seedlings sent up some new growth each spring, but it was promptly killed by the Nantucket pine tip moth.

Hand vs. Machine Planting

First-year survival percentages, were used to compare the effectiveness of hand and machine planting for 4 species:

Pine species	Hand-planted	Machine-planted
Slash	96	92
Loblolly	95	95
Longleaf	55	34
Monterey	45	51
All species	73	68

Only with longleaf was survival appreciably affected by planting method; the advantage for hand planting was significant at the one-percent level, and was attributed to better control of planting depth. An inspection of surviving longleaf seedlings after three years revealed a much wider variation in root collar depth for machine-planted than for hand-planted stock. Root collars of some machine-planted longleaf seedlings were found to be as much as four inches beneath the soil surface. No shallow-planted seedlings were found, but it was

TABLE 1.—AVERAGE SURVIVALS OF HAND-PLANTED PINES ON CLEARED SANDHILLS AT THE END OF EACH OF THE FIRST FOUR GROWING SEASONS

Pine species	Growing season			
	First	Second	Third	Fourth[1]
	Percent			
Slash	96	95	94	93
Loblolly	95	91	90	88
Shortleaf	91	89	88	88
Longleaf	55	49	45	35
Monterey	45	21	6	3

[1]Survival of slash pine was significantly higher than that of either loblolly or shortleaf pine. Survival of each of these three species was very significantly higher than that of either longleaf or Monterey pine.

presumed that all such had died, for shallow planting is deadly to longleaf seedlings.

Insect and Disease Attacks

Only slash pine has remained relatively free of serious pests. Insect damage has been almost nonexistent, but a few individuals have been infected by fusiform rust, *Cronartium fusiforme* (A.&K.) Hedge. and Hunt.

Loblolly, shortleaf, and Monterey pines have been severely attacked by the Nantucket pine tip moth, *Rhyacionia frustrana* (Comst.). During the second growing season, 96 percent of the loblolly and 93 percent of the shortleaf pines were infested by the insect. Infested trees looked r a g g e d, often misshapen, and many of the young shortleaf sprawled along the ground (*6*). By the end of the fourth growing season, most of these trees seemed to be outgrowing the damage. Monterey pine was heavily attacked by the pine webworm, *Tetralopha robustella* Zell., as well as by tipmoth.

Brown-spot needle blight, *Scirrhia acicola* (Dearn.) Siggers, has been chiefly responsible for the steady reduction in longleaf pine numbers after the first growing season. The seedlings were unprotected by sprays, and lack of fuel made prescribed burning unfeasible. It is obvious that some form of protection against brown spot must be given to longleaf plantings on cleared sites. The hazard there seems greater than on less thoroughly prepared sites, for the seedlings are fully exposed to spores carried by wind or rain splash.

Discussion

The performance of slash pine on these denuded plots has been gratifying. Another study on the Chipola Experimental Forest has shown that height growth can be substantially improved by preparing the planting area with a large Marden double-drum brush chopper (*3*), which leaves the topsoil in place instead of removing it as the rootrake-scalper does. Furthermore, the chopper partially incorporates scrub oak-wiregrass debris into the soil, instead of pushing it into a windrow.

Both loblolly and shortleaf pines have done surprisingly well, and if protected from tip moth might do even better.

Before longleaf can be accepted for sandhills reforestation, problems of low survival, slow initiation of height growth, and brown-spot needle blight must be overcome. Perhaps the best chance for establishing satisfactory stands of longleaf is offered by direct-seeding techniques now under development for cleared sandhill sites. These techniques appear capable of establishing 1,200 to 1,500 seedlings per acre at the end of the first growing season, at a reasonable cost. With this stocking, there should be little difficulty in obtaining 600 to 750 trees in height growth by the end of the fourth growing season.

Little has been published concerning Monterey pine in the South, but its record in this area consists of one failure after another. Files of the Southern Forest Experiment Station show that direct seeding attempts in Florida before 1922 were unsuccessful, and that from 1927 to 1933 several test plantings failed on the Choctawhatchee National Forest. Attempts were made to grow planting stock in Texas, Louisiana, and Florida in 1929 and in Louisiana for several years thereafter. Scalped spots were also direct-seeded. In each of these attempts, cold killed the seedlings either in the nursery bed, in the field shortly after planting, or in the field the winter following.

In 1952, Monterey pine was grown in a nursery in Mississippi and planted at Millard, Mississippi, and in Washington Parish, Louisiana. Early mortality was heavy,

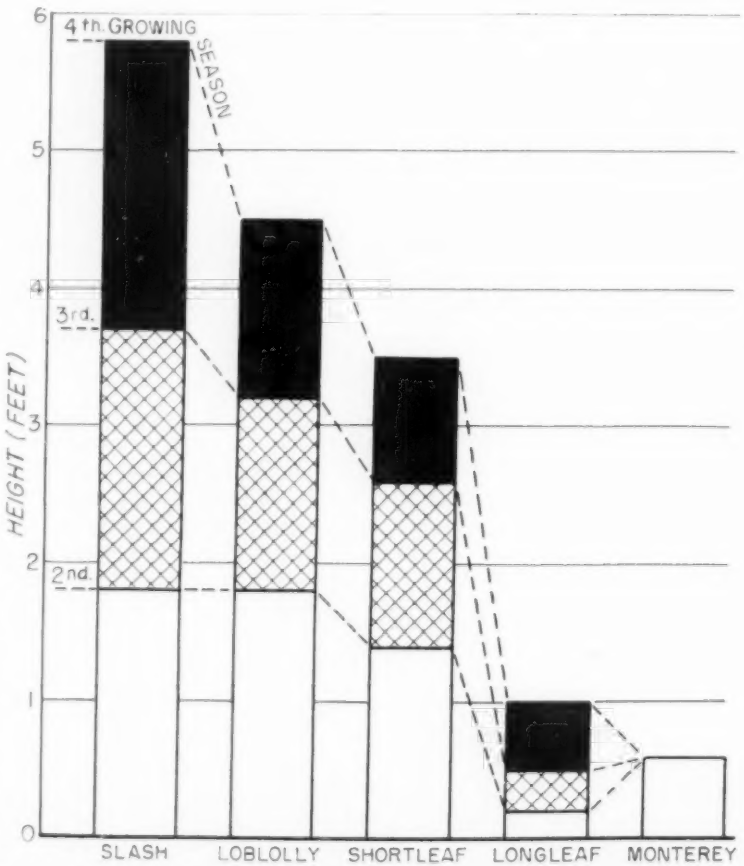

FIG. 3.—Average heights of hand-planted pines at the end of the second, third, and fourth growing seasons.

FIG. 4.—Slash pine plot at the end of the fourth growing season.

height growth negligible, and tip moth abundant in the Mississippi planting. Two or three years after planting, the Louisiana trees gave evidence of having started rapid height growth, but most of the survivors had stem cankers resembling those of the rust diseases *Cronartium fusiforme* and *C. cerebrum* Hedge, and Long.[2]

No attempt was made to determine the precise causes for the failure of Monterey pine in the present test. Rawlings (8), who studied the species intensively, has made the following observation, however:

"Here [east Texas and the southern States] besides unsuitable soil and climatic conditions, the trees are subject to severe attack by the numerous insects and fungi normally associated with the native pines In this case *P. radiata* has almost all the disadvantages and none of the advantages of an exotic."

Specifically, he states that Monterey pine will not grow well in poor soils deficient in minerals, that it is liable to be damaged by temperatures below 12°F. and unseasonable frosts of much less severity, and that it requires a climate which provides an annual rainfall of over 30 inches with dry summers and wet winters. The sandhill soils of west Florida are low in fertility, early and late frosts are fairly common, and summers are wet and winters relatively dry—a situation almost directly opposed to the optimum. Considering these statements and the supporting evidence of the several trials, there seems to be little need for further testing of Monterey pine in Florida or in the rest of the South, for that matter.

The present study has by no means exhausted the list of species with the potential for sandhills regeneration. In other tests on the Chipola Experimental Forest, sand pine (*Pinus clausa* [Chapm.] Vasey) has consistently produced better early height growth than slash pine. Its survival, however, has been erratic. Virginia pine (*Pinus virginiana* Mill.) has shown a remarkable ability to survive, but its height growth frequently leaves much to be desired.

A test now under way will compare sand, slash, loblolly, and longleaf pines on a sandhill site prepared with a Marden double-drum brush chopper. The longleaf pine will be protected from brown-spot with fungicidal sprays.

Summary and Conclusion

A test comparing the suitability of five pine species for planting on the deep sands of west Florida was established in January 1954. Slash, loblolly, longleaf, and Monterey pines were planted both by hand and by machine on a site cleared of all vegetation by a rootrake-scalper. Shortleaf pine was hand planted only.

After four growing seasons, survivals of slash, loblolly, and shortleaf pines averaged 92, 93, and 88 percent, respectively. Only 32 percent of the longleaf pine still lived, and Monterey pine failed almost completely. Slash pine heights averaged 5.9 feet, as compared with 4.4 feet for loblolly pine and 3.5 feet for shortleaf pine. Only with longleaf did hand-planting produce better first-year survivals than machine planting.

Slash pine appears the most desirable of the five species tested for sandhills reforestation. The stands will be followed for several years, however, to determine whether these early relationships will be maintained. In addition, a new study will be installed on a sandhills site prepared by chopping, a method which has proved superior to rootraking. Slash, loblolly, longleaf, and sand pine—a very promising species—will be compared.

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[2]Communication from Philip C. Wakeley, Southern Forest Experiment Station, New Orleans, La. February 10, 1958

Lodgepole Pine Clearcuts in Northeastern Oregon

James M. Trappe

LODGEPOLE PINE (*Pinus contorta*) in the Blue Mountains of northeastern Oregon typically forms stands with densities up to 2,000 stems per acre and diameters at breast height averaging less than 6 inches (Fig. 1). Until 1952, small tree size limited utilization to occasional firewood or corral pole cutting. At that time, the Pilot Rock Lumber Company started harvest cutting of trees to be chipped in fibreboard manufacture.

Harvested wood was hauled to the mill in three different forms: 8-foot cordwood, logs up to 32 feet long, and chips. Good utilization was possible because cordwood and logs larger than 2 inches diameter at the small end were acceptable at the mill, whereas whole stems were chipped in the forest-chipping operation (*3*). Stumps were cut low enough that a bulldozer could run over them, and slash was left as it lay, except for clearing of truck trails.

Size and shape of clearcuts were governed by ownership and by stand boundaries. Individual clearcuts seldom exceeded 40 acres.

To evaluate results of clearcutting, the Pacific Northwest Forest and Range Experiment Station and the Pilot Rock Lumber Company cooperated in an examination in 1956 of eight clearcuts, ranging from one to four years old. On each clearcut, eight 50-point transects were used to measure ground disturbance, slash concentration, and ground-cover vegetation. Windthrow and snowbreak of leave trees were evaluated for a 1-acre area surrounding each transect. On seven of the clearcuts, 50 one-milacre plots were used to estimate density and distribution of tree regeneration. In one clearcut, height growth response to release was measured on advance regeneration.

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Soil Disturbance

The harvesting operation exposed little mineral soil. Exposure by different harvest methods averaged 8 percent of total ground surface for log skidding and loading, 4 percent for tree skidding and chipping, and 2 percent for cordwood cutting. Cordwood cuttings required no skidding. In the chipping operation, entire trees were skidded. Soil disturbance from log skidding compares to that on lodgepole clearcuts in Montana (*1*) and Utah (*5*).

The pumicite on which most lodgepole grows in the Blue Mountains (*6*) is very erosive. But because clearcutting was on gentle topography and because little mineral soil was exposed, erosion was not a problem.

Slash

On the average, slash covered about 40 percent of the ground surface (Table 1). Size and density of the stand strongly influenced the amount of slash.

Branches were the main source of slash. Tops and chunks contributed only small amounts since the typically small stems seldom broke in falling and utilization was good. Slash from submerchantable trees knocked over by logging or from windthrow and snowbreak of residual stems was negligible.

Over half of the slash cover was 6 inches deep or less. A fourth of the slash was 7 to 12 inches deep, whereas only a tenth was deeper than 12 inches.

Fire hazard on lodgepole clearcuts remains high for several years. Needles were still attached to the twigs on 2-year-old cuttings and slash piles did not compact much until the fourth year. On the 4-year-old cuttings, some needles and many small twigs remained attached. Older clearcuts were not available for observation.

Residual Stand

The nature of the original stand governed the size and number of trees left on the clearcuts. Stems too small to handle economically or

FIG. 1.—A typical lodgepole pine stand in northeastern Oregon. It averages about 1,000 stems per acre and 5 inches d.b.h. Western larch is growing as understory regeneration.

too large for the chipper (over 17 inches at the butt) were left. Scattered western larch (*Larix occidentalis*), Douglas-fir (*Pseudotsuga menziesii*), and grand fir (*Abies grandis*) were not cut.

Windthrow and snowbreak damage of residual trees increased by species as follows: grand fir, western larch, lodgepole pine, and Douglas-fir. For lodgepole, stems 6 to 12 inches d.b.h. were most resistant to both wind and snow damage. The greatest proportional windthrow occurred in stems over 12 inches d.b.h. Snowbreak was common in stems less than 6 inches d.b.h.

Long-crowned, "wolfy" lodgepole stems were least susceptible to either windthrow or snowbreak (Fig. 2). This type of crown develops in stands under two situations: trees older than the stand as a whole—usually trees that survive a fire and provide a seed source for the new stand—or trees that grow at the edge of openings. Such trees have to be windfirm to remain in the stand. On the other hand, slender-stemmed trees with short crowns broke under relatively small loads of wet snow; trees of this type had usually developed in dense thickets where root competition was intense. The resulting small root systems did not provide good support during strong winds.

Most wind and snow damage to grand fir, western larch, and Douglas-fir occurred on trees less than 6 inches d.b.h. Larger trees were generally taller than the lodgepole canopy and had developed resistance to windthrow. Grand fir and western larch suffered little damage regardless of crown size or shape. Long-crowned Douglas-firs, however, were more windfirm than short-crowned. Windthrow around edges of clearcuts was negligible.

TABLE 1.—AVERAGE GROUND SURFACE COVERED WITH SLASH, BY DEPTH CLASSES, ON LODGEPOLE PINE CLEARCUTS IN NORTHEASTERN OREGON

Slash source	Ground surface covered					
	1-6 inches deep	7-12 inches deep	13-18 inches deep	19-24 inches deep	25+ inches deep	All depths
	Percent					
Branches	22.6	5.8	1.2	0.2	0.0	29.8
Tops	1.7	3.6	1.6	.6	.1	7.6
Chunks	1.4	.8	.2	.0	.0	2.4
Small trees[1]	.3	.5	.1	.0	.0	.9
Windthrow[2]	.1	.1	.0	.1	.0	.3
Snowbreak[2]	.1	.1	.0	.0	.0	.2
All sources	26.2	10.9	3.1	0.9	0.1	41.2

[1]Submerchantable trees knocked down by logging.
[2]Residual trees.

Regeneration

Most lodgepole stands in northeastern Oregon have advance reproduction in the understory (*6*). On four of the clearcuts examined, good stands of undamaged advance regeneration remained after cutting (Table 2). Advance seedlings less than 3 feet tall on the clearcuts were not permanently damaged by logging, but larger seedlings and saplings were broken and rooted out where growing in the path of skidding.

Regeneration was not always obtained following clearcutting. Lodgepole pine in northeastern Oregon does not usually retain seed for more than a year after cones ripen (*6*). Therefore, slash does not contribute much more seed than the current production, which is lost if cutting precedes seed ripening. Most seed from surrounding uncut timber probably is dropped within 2 chains of the timber edge (1). Accordingly, in large clearcuts regeneration after cutting depends much on seed trees.

Seedbeds of mineral soil supported the most new seedlings. Area for area, almost twice as many lodgepole seedlings grew on mineral soil as on undisturbed litter. The majority of seedlings also were established in the open rather than under protecting slash accumulations.

In all clearcuts, stocked areas were densely overcrowded (Table 2). Even where seedlings were poorly distributed (the lower milacre percentages), over 2,000 seedlings per acre were crammed into the stocked area. Where stocking exceeds 800 stems per acre, serious crowding may begin in the first decade after establishment (*6*).

FIG. 2.—A 1-year-old lodgepole pine clearcut in which tree lengths were skidded and chipped. "Wolfy" lodgepole at left is good risk for seed tree. Scattered "whips" in background are highly subject to snow and wind breakage.

TABLE 2.—STOCKING WITH UNDAMAGED REPRODUCTION ON SEVEN LODGEPOLE PINE CLEARCUTS IN NORTHEASTERN OREGON, BY MILACRE PLOTS

Time of seedling establishment and species	Years since cutting						
	1	2					4
	Percent						
Before cutting:							
Lodgepole pine	0	20	8	50	0	0	18
Western larch	0	8	0	2	2	2	0
Douglas-fir	0	16	0	0	0	8	0
Grand fir	0	10	0	0	86	50	0
After cutting:							
Lodgepole pine	62	0	26	28	4	2	30
Western larch	0	0	0	0	6	0	0
Douglas-fir	0	2	0	0	0	2	0
Grand fir	0	2	0	0	0	2	0
All reproduction	62	58	34	80	98	66	48
Seedlings per acre (all species) on stocked plots	9,480	3,140	5,300	10,480	7,350	3,460	2,340

Release Response by Advance Reproduction

Response of advance lodgepole reproduction to release was evaluated on a 4-year-old clearcut. Height growth over an 8-year period was compared with that of seedlings and saplings growing in an adjacent opening. Growth of advance reproduction before cutting averaged only half that of trees in the open (Fig. 3). No marked response to release was shown until 1956, four years after cutting. Then, released trees grew significantly more than open-grown trees, probably because trees in the opening were starting to crowd each other, whereas released trees were generally widely spaced. Similar measurements on western larch showed that before clearcutting, seedlings under the lodgepole canopy were growing as well as those in the open. Growth of released seedlings had not improved by the fourth year after clearcutting.

Understory Vegetation

Clearcutting markedly affected several plants commonly found under lodgepole pine stands. In general, shrubs decreased and forbs increased.

Grouse whortleberry (*Vaccinium scoparium*), a major species in lodgepole stands, almost entirely disappeared from clearcuts. It survived only where sheltered by slash or residual trees. Dwarf blueberry (*V. cespitosum*) grew in clearcuts, but appeared less vigorous than under the pine canopy. Common pipsissewa (*Chimaphila umbellata*) disappeared from clearcuts, whereas pinemat manzanita (*Arctostaphylos nevadensis*) thrived in either situation.

Of the forbs, mountain thermopsis (*Thermopsis montana*) particularly benefited from cutting release. It became more abundant and vigorous within a year after clearcutting. Pale agoseris (*Agoseris glauca*), bull thistle (*Cirsium lanceolatum*), Eaton fleabane (*Erigeron eatoni*), and sheep sorrel (*Rumex acetosella*) all invaded clearcuts, particularly those that were grazed.

Western fescue (*Festuca occidentalis*) was the only grass normally found in lodgepole stands that increased after clearcutting. Pinegrass (*Calamagrostis rubescens*) and elk sedge (*Carex geyeri*) both decreased.

Preliminary Recommendations for Clearcutting Lodgepole Pine

The best method of clearcutting lodgepole pine depends on management objectives. In northeastern Oregon, lodgepole is a fire subclimax, occupying sites suitable for other species (*6*). At present little is known about the potential growth and production of lodgepole as compared to that of other species. The landowner must decide as best he can what to grow, then manage the cutting accordingly. The following recommendations are based on this study, general observations in the Blue Mountains, and experience in other regions.

Timing the cut.—Timing is important in species control. If lodgepole regeneration is desired, cutting should follow ripening of the current seed crop. If other species are wanted, cutting early in the year will reduce the amount of available lodgepole seed.

Size and shape of clearcuts.—Long, narrow clearcuts will insure good lodgepole reproduction, but thinnings are necessary to get adequate spacing. Alternate clear-strip cutting (*2*) should work well in healthy stands. This system also appears good for retarding spring snow melt. Large, circular clearcuts with seed trees will minimize the need for thinnings, because overstocking is less likely away from edges of the cut. If other species are desired or mistletoe is present, large clearcuts without lodgepole seed trees are best.

Slash treatment.—Slash burning creates favorable seedbeds for lodgepole, greatly increasing the probability of badly overstocked stands. Also, burning seriously reduces the amount of advance regeneration. Even if clearcuts were to be planted with other species, a dense lodgepole stand established after burning would probably compete seriously with planted seedlings.

Fire hazard may be reduced considerably without burning by keeping clearcut areas small and surrounded by green timber, by breaking slash areas into small units with bulldozed fire trails, and by chipping slash accumulations.

Residual trees.—To get good stocking of lodgepole reproduction on large, unburned clearcuts, seed trees should be left at 2- to 3-chain intervals. Long-crowned trees 6 to 12 inches d.b.h. are best for the purpose because of windfirmness. Good form and small limbs also are desirable characteristics. All mistletoe-infected trees should be cut.

Seed trees of other species are not always present. But in selecting seed trees of western larch and grand fir, good form and health are the prime considerations since these species are relatively windfirm.

Douglas-fir is less windfirm than larch and grand fir, and long-crowned Douglas-firs should be preferred to short-crowned. All mistletoe-infected trees should be cut.

If Engelmann spruce and ponderosa pine are desired, they generally should be planted. Spruce is notoriously subject to windthrow, and residual seed trees are not likely to live long enough to reproduce a stand. Ponderosa pine usually is not common enough on lodgepole cutovers to provide adequate seed, and its seed crops occur irregularly.

Forage improvement. — Lodgepole pine clearcuts do not provide good range unless grass is seeded. Since lodgepole usually grows on good timber sites, more return from the sites can be realized from trees than from forage. However, establishment of a good grass stand may have merit in restricting lodgepole reproduction, thus reducing the possibility of overstocking. Grass has been seeded successfully on lodgepole burns in eastern Oregon (*4*).

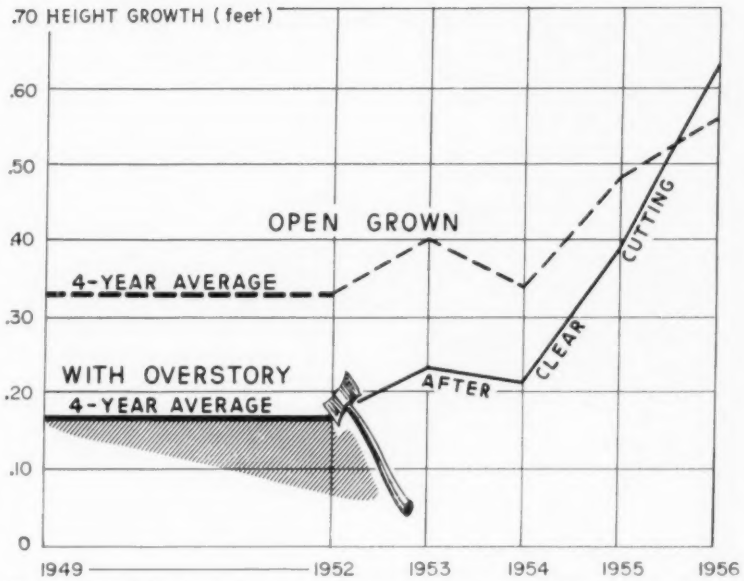

FIG. 3.—Annual height growth of open-grown lodgepole pine seedlings in comparison with advance regeneration released by clearcutting.

Summary

Eight lodgepole pine clearcuts in northeastern Oregon were examined to evaluate soil disturbance, slash, residual trees, regeneration, and response of understory vegetation. The study disclosed these points:

1. Soil disturbance averaged 2 to 8 percent of the ground surface, depending on method of cutting and skidding.

2. Slash covered about 40 percent of the ground surface. Three-fourths of it was less than a foot deep.

3. Of the scattered residual lodgepole, long-crowned stems 6 to 12 inches d.b.h. were most windfirm.

4. Advance regeneration contributed materially in forming the new stand. Much of this was Douglas-fir, grand fir, and western larch.

5. Areas stocked by reproduction were generally too densely stocked.

6. Of the understory vegetation, shrubs generally decreased and forbs increased after cutting.

Preliminary recommendations for clearcutting lodgepole pine in northeastern Oregon, based on the study results, are presented.

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Reproduction of Upland Central Hardwoods as Affected by Cutting, Topography, and Litter Depth

Leon S. Minckler and Chester E. Jensen

THE FUTURE PRODUCTIVITY of any forest stand depends to a large extent upon the natural reproduction that follows cutting. If a stand is to produce merchantable timber continually, it must contain enough of the right kind of young trees to assure adequate stocking for the future. Hence reproduction has always been one of the primary concerns of foresters and forest owners.

For many years prior to about 1935, much of the forest land in the Central Hardwoods Region burned over frequently or was heavily grazed. During the past 20 years, however, many stands have been protected and reproduction has often developed at a rapid rate.[1] It was to investigate the development of reproduction after partial cutting on such protected areas in southern Illinois (Kaskaskia Experimental Forest) that the present study was conducted.

Quantitative data on reproduction in the upland central hardwoods are scarce. No data were available for southern Illinois on the amount of advanced reproduction or new reproduction following cutting.

This article gives the amount of reproduction present after cutting by species and age classes as it is affected by (1) partial cutting of the overstory, (2) topography, (3) litter depth, and (4) other factors. The paper also shows how this information can be used in silvicultural practice.

THE AUTHORS are staff members of the Central States Forest Experiment Station, Forest Service, U. S. Department of Agriculture, Columbus, Ohio.

[1] Liming, Franklin G., and John P. Johnston. Reproduction in oak-hickory forest stands of the Missouri Ozarks. Jour. Forestry 42:175-180. 1944.

The Study Area

The survey of reproduction was made on 7 blocks of mixed hardwoods and 3 blocks of the oak-hickory type, totaling about 200 acres. The mixed-hardwood type occurs in moist coves and on northerly slopes, and the oak-hickory type occurs on dry ridgetops and southerly slopes. The more important species are oaks, hickories, and yellow-poplar (*Liriodendron tulipifera* L.). Most of the species are common to both types except that yellow-poplar occurs only on the moister sites and post oak (*Quercus stellata*, Wangenh.) occurs only on the drier sites.

A combined harvest and improvement cut on all areas 4 years previous to the examination removed 600 to 1,200 board-feet of sawtimber per acre. Girdling all cull trees removed about 6 additional sawtimber-sized and 30 pole-sized trees per acre.

Methods of Study

Reproduction was sampled by running 8 to 12 lines of milacre plots across the drainages on each area. The lines were mechanically spaced and about equidistant. Sample plots were located every half chain in the uncut parts of the stands and every quarter chain in the cut openings. Distances were determined by pacing. Six hundred plots were tallied in the mixed hardwood type and 240 plots in the oak-hickory type.

Advanced reproduction was present at the time of cutting 4 years previously. New reproduction has developed since cutting. Advanced reproduction was distinguished from new reproduction by examining terminal bud scars and by observing general appearance. Judgment was checked by counting annual rings on questionable seedlings. However, no attempt was made to separate seedlings, seedling sprouts, and sprouts from old root stocks (mostly oak). A very few sprouts grew from cut or damaged saplings and these were tallied as new reproduction. If the sprouts from old root stocks had developed since the cutting, those also were counted as new reproduction.

Statistical Tests

Milacre samples of the reproduction survey were considered to be random observations for the purpose of statistical analysis. Where possible, "t" tests of differences *between* paired observations were the basis for evaluating differences between group means. Where there was no basis for pairing observations, variations *among* individual observations of the groups compared were the basis for testing differences between the means of the groups. The discussion that follows emphasizes the differences between categories, the means of which were found to be significantly different at the level of two standard deviations or 5 percent level.

Methods of Presenting Data

Reproduction data are given in terms of mean number of seedlings per milacre plot or per acre. This gives the average number of seedlings on each of the areas but tells nothing about the *distribution* of the seedlings over the area. Distribution is shown by plotting the mean number of seedlings per milacre plot over the percentage of plots stocked (Fig. 1). All points fell approximately on the curve regardless of species or species group, forest type, or occurrence of past

cutting. Thus, it is possible to predict the percent stocking from the seedling frequency as shown by Stoeckeler and Macon.[2] It is well known, however, that the percentage of stocked small (milacre) plots always gives a low estimate of future stocking. Density increases as the trees increase in size and occupy more space.

Amount of Reproduction Present

In general, there was adequate reproduction of desirable species, but there were also many seedlings and saplings of poor (miscellaneous) timber species and non-timber species (Tables 1 and 2). The species classed as desirable are hickory (*Carya* spp.), white oak (*Quercus alba* L.), black and red oaks (*Q. velutina* Lam. and *Q. rubra* L.), yellow-poplar, hard maple (*Acer saccharum* Marsh.), white ash (*Fraxinus americana* L.), and black walnut (*Juglans nigra* L.). Hickory and maple are considered less desirable than the other species.

Hickory reproduction was the most abundant, but there were also at least 1,000 oak seedlings per acre. Yellow-poplar occurred almost entirely as new reproduction in cut openings and on the moister sites. Under these conditions there were 400 seedlings per acre. Also on the moister sites, there were about 200 seedlings each of hard maple and ash. Very little black walnut and post oak reproduction was present.

Miscellaneous and the non-timber species were abundant, but their combined total was slightly less than the total for desirable species on the areas surveyed. On the drier sites, there were about twice as many desirable seedlings as all others (Table 3).

Amount of Advanced and New Reproduction

On the more moist sites, there was more advanced than new reproduction of hickory, white oak, hard maple, and miscellaneous species. Black and red oaks, yellow-poplar, and the non-timber species had more new reproduction. On the drier sites, there was much more new than advanced oak and hickory reproduction, especially in the cut openings. This was partly because sprouts from damaged seedlings and saplings were tallied as new reproduction, i.e., some of the advanced reproduction was converted to new by this means. Also numerous oak root stocks sprouted after the cut and retained these sprouts, probably because of the increased light.

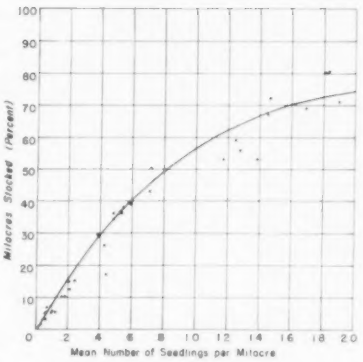

FIG. 1.—Curve showing relation between percentage of milacres stocked and number of seedlings per milacre. Dots represent species or species groups for two forest types and for both cut and uncut overstory.

On the more moist sites, yellow-poplar was the only species that increased in abundance in the cut openings. On the drier sites, hickory and the oaks showed more new reproduction in cut openings, but this was balanced by a loss of advanced reproduction and was probably caused by sprouting from damaged advanced seedlings, root stocks, or saplings.

New reproduction grew faster in cut openings than under the canopy during the 4 years. In cut

TABLE 1.—MEAN NUMBER OF SEEDLINGS PER ACRE BY SPECIES, AGE CLASS, AND CONDITION OF RELEASE
(Mixed hardwood type)

Species	Advanced[1] reproduction		New[2] reproduction		Age class means	
	Under canopy	Cut openings	Under canopy	Cut openings	Advanced	New
Hickory[3]	950	950	520	500	950	510
White oak	420	340	170	140	380	160
Black & red oaks	220	190	300	340	210	320
Yellow-poplar	20	40	160	400	30	280
Hard maple	140	170	30	40	160	40
White ash	110	120	100	120	120	110
Black walnut	10	10	40	20	10	30
Total	1,870	1,820	1,320	1,560	1,850	1,440
Miscellaneous	890	800	360	380	850	370
Non-timber	750	980	940	920	870	930

[1]Reproduction present at time of cutting 4 years previously.
[2]Reproduction which started after cutting, i.e., 4 years old or less.
[3]Hickory (upland species of Carya on the area).

TABLE 2.—MEAN NUMBER OF SEEDLINGS PER ACRE BY SPECIES, AGE CLASS, AND CONDITION OF RELEASE
(Oak-hickory type)

Species	Advanced[1] reproduction		New[2] reproduction		Age class means	
	Under canopy	Cut openings	Under canopy	Cut openings	Advanced	New
Hickory	870	610	940	1,220	740	1,080
White oak	250	90	300	400	170	350
Black & red oaks	300	200	420	510	250	470
Post oak	80	10	40	10	50	30
Yellow-poplar	0	0	90	70	0	80
Hard maple	30	0	10	10	20	10
White ash	30	0	30	80	20	60
Total	1,560	910	1,830	2,300	1,240	2,070
Miscellaneous	260	260	130	170	260	150
Non-timber	300	420	980	970	360	980

[1]Reproduction present at time of cutting 4 years previously.
[2]Reproduction which started after cutting, i.e., 4 years old or less.

[2]Stoeckeler, J. H., and J. W. Macon. Regeneration of aspen cut-over areas in northern Wisconsin. Jour. Forestry 54: 13-16. 1956.

TABLE 3.—MEAN NUMBER OF SEEDLINGS PER ACRE BY BROAD SPECIES, GROUPS, AGE CLASSES, AND CONDITION OF RELEASE

New or advanced reproduction	Total of desirable species		Miscellaneous species		Non-timber species	
	Under canopy	Cut openings	Under canopy	Cut openings	Under canopy	Cut openings
	Mixed Hardwoods					
Advanced reproduction	1,870	1,820	890	800	750	980
New reproduction	1,320	1,560	360	380	940	920
Total	3,190	3,380	1,250	1,180	1,690	1,900
	Oak-Hickory					
Advanced reproduction	1,560	910	260	260	300	420
New reproduction	1,830	2,300	130	170	980	970
Total	3,390	3,210	390	430	1,280	1,390

openings there were 630 desirable new seedlings 1 foot or higher per acre whereas on uncut areas there were only 420 of that size. Most of the stimulation of height growth as a result of lessened competition in the openings will occur later.

Effect of Topography on Reproduction

The amount of reproduction was distinctly different on different topographic sites (Table 4). On more moist sites, the hickories and oaks were most abundant on middle northerly slopes and least in coves and on lower northerly slopes. Yellow-poplar had about twice as much reproduction on lower northerly slopes as anywhere else. The miscellaneous species were definitely most abundant on moist sites and rather scarce on the drier sites. The non-timber species occurred least frequently on ridgetops.

The hickories and oaks tend to reproduce better on the relatively drier sites but the reverse is true for the miscellaneous and non-timber species. On the other hand, nearly all yellow-poplar reproduction is on the moister sites where undesirable miscellaneous and non-timber species are most abundant. So it is on these better sites that the most severe competition between "good" and "bad" reproduction can be expected.

Effect of Litter Depth on Reproduction

It is well known that the amount of leaf litter influences frequency of reproduction, but quantitative data are scarce.[3] On the moister sites (mixed-hardwood type), all species except the oaks reproduced more successfully where the litter was thinnest (Fig. 2). Yellow-poplar required practically bare soil or at most thin and patchy litter. In cut openings on the moister sites, a scarcity of litter was particularly beneficial for hickory, yellow-poplar, miscellaneous, and non-timber species. The latter two groups of species, however, are also fairly tolerant of thicker litter. Success of oaks, on the other hand, was not greatly affected by litter depth. Hickories did better in thicker litter on drier sites (oak-hickory type) than on more moist sites (Fig. 3).

Location on the slope had a slight relationship to litter depth on the moist sites but this could not account for the differences in reproduction (Table 4). In the coves the percentage of plots with litter 2 inches deep or more was only 3 to 4 percent higher than for lower and middle slopes. On the drier sites the litter depth and location on slope showed no consistent relationship.

[3] Koroleff, A. Leaf litter as a killer. Jour. Forestry 52: 178-182. 1954.

Effect of Overstory Species on Reproduction

In the stands studied, the overstory species were generally mixed in various proportions. In uncut portions of the stand, the abundance of an overstory species influenced the frequency of reproduction of that species. So stands predominantly oak and hickory had relatively little ash, hard maple, or yellow-poplar reproduction. And stands with little oak in the overstory had much less oak reproduction. In cut openings, new reproduction of yellow-poplar was 11 times more abundant on plots where at least one yellow-poplar seed tree was present within about 5 chains than where seed trees were absent from the immediate vicinity.

Meaning of Results for Silviculture

Reproduction of desirable species on upland hardwood areas protected for about 20 years was plentiful and well distributed over the

TABLE 4.—NUMBER OF SEEDLINGS[1] PER ACRE BY SPECIES,[2] SEEDLING AGE CLASS, AND TOPOGRAPHIC POSITION

Topographic position[3]	Hickory		White, black and red oaks		Yellow-poplar		Miscellaneous		Non-timber	
	Advanced	New	Advanced	New	Advanced	New	Advanced	New	Advanced	New
Coves	870	420	440	295	60	205	1,105	440	880	565
Lower northerly slopes	800	560	570	365	15	485	920	385	920	1,015
Middle northerly slopes	1,140	570	695	630	15	250	570	310	725	1,130
Lower southerly slopes	160	560	110	930	0	80	505	240	230	1,520
Upper southerly slopes	720	905	455	640	0	0	370	200	540	1,075
Ridgetops	830	1,280	440	915	0	0	160	110	240	830

[1] Unweighted means of seedlings per acre under canopy and seedlings per acre in cut openings.
[2] Within species or species groups values differing by more than the number of seedlings per acre shown below are significantly different 95 percent of the time:
Hickory—240 Yellow-poplar—160 Non-timber—250
Oaks —160 Miscellaneous—200
[3] Arranged in order from moist to dry.

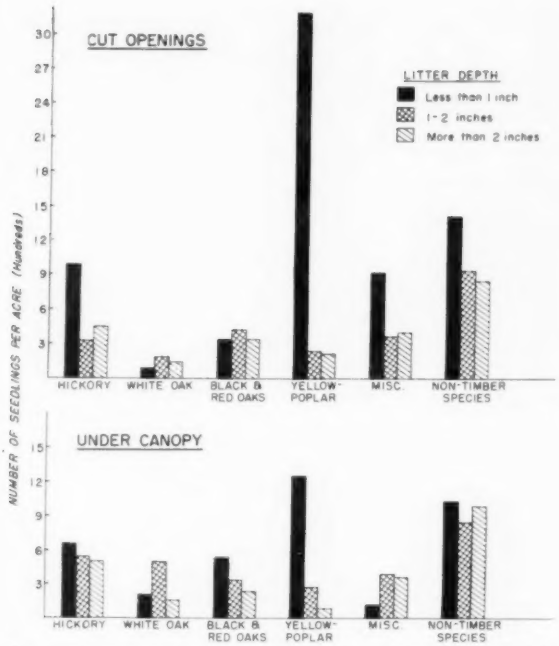

FIG. 2.—New reproduction on moist sites (mixed hardwoods) by species groups, litter depth, and condition of release.

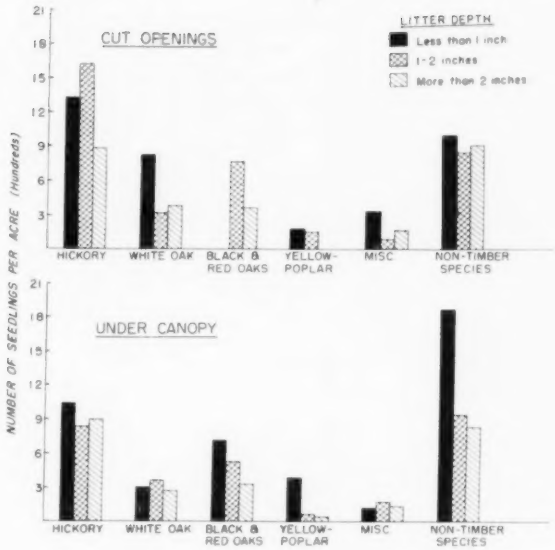

FIG. 3.—New reproduction on drier sites (oak-hickory) by species groups, litter depth, and condition of release.

areas studied. More than 90 percent of all milacre plots examined had at least one seedling of a desirable species present. However, reproduction of undesirable timber species and non-timber species was also plentiful, especially on the better, moister sites. Thus, these poorer species will offer more competition on the better timber growing sites than on the poorer sites. It may be necessary to aid the better species by release and weeding. Additional measures required are cutting methods which provide adequate openings for light and scarification of the ground surface.

Although classed as desirable, hickory was relatively too plentiful and will probably compete with yellow-poplar and the better oaks. Hickory will undoubtedly be well represented in the future stands unless weedings are made. Unless actually overtopped by hickory, however, the oaks and especially yellow-poplar will usually outgrow it. Also, the non-timber species offer less competition to the oaks and yellow-poplar than would be inferred from their numbers. These species grow slowly, seldom reach large size, and are soon overtopped by the timber species. In addition, sassafras (*Sassafras albidum* [Nutt.] Nees) has rather sparse foliage that usually allows some reproduction to grow under it.

The chief danger from the miscellaneous and non-timber species lies in their potential ability to fully occupy the cut opening before the better timber species can become established. Steps that may prevent this include (1) destroying

FIG. 4.—Yellow-poplar reproduction 6 years after cutting an opening in the canopy about 100 feet in diameter. There was little competing vegetation, the ground was scarified by logging, and there were several nearby yellow-poplar seed trees.

unwanted advanced reproduction, (2) properly preparing the seedbed, and (3) making openings large enough to promote vigorous growth of the intolerant oaks and yellow-poplar. The *new* reproduction of the poor species can seldom compete with desirable advanced reproduction or desirable new reproduction of the same age.

Litter depth in the cut openings at the time of germination can be partially controlled by logging practices or by deliberate soil scarification. For the oaks, special effort is seldom warranted because they germinate well in moderate litter. In fact, destroying litter should be discouraged in the oak-hickory type because thin litter is more favorable for the miscellaneous and non-timber species than it is for the oaks. And yellow-poplar is not suited to these dry sites anyway.

On good sites, the conditions needed for establishment and successful development of yellow-poplar reproduction are definite: (1) bare soil or thin litter, (2) presence of seed trees within effective seeding range, (3) openings large enough to allow full sunlight for at least one-third of the day, and (4) absence of heavy overtopping by advanced reproduction of other species (Fig. 4). The advanced reproduction most likely to impede yellow-poplar and the oaks is composed chiefly of blackgum, the elms, hickory, maple, and the non-timber species. Because of relatively greater tolerance, these species persist for long periods under the canopy and increase their growth rate when openings are made.

Summary

A survey of reproduction was made in 10 partially cut stands in central hardwoods upland types. On both moist and dry sites there was an average of more than 3,000 desirable, well-distributed seedlings per acre on the 10 areas surveyed. On the moist sites there were an additional 1,200 seedlings per acre of miscellaneous (undesirable) timber species and 1,800 of non-timber species. On the drier sites there were an additional 400 seedlings of miscellaneous and 1,300 seedlings of non-timber species. In general, competition from advanced reproduction of unwanted species was greatest on the moister sites; it is on these sites that cultural measures would be most effective.

Reproduction of the oaks and hickories was better on middle and upper slopes and on ridgetops. Reproduction of yellow-poplar was best on lower, northerly slopes.

In general, all species had more new reproduction on plots with the thinnest litter. The oaks, however, did just as well on plots with 1 inch of litter. Thicker litter caused only relatively slight reductions in oak reproduction. On drier sites, hickory reproduction was reduced only a small amount by thick litter.

Yellow-poplar was extremely sensitive to thick litter. This species definitely required cut openings, seed trees in the overstory, a seedbed with bare soil or thin litter, and absence of excessive brush. Yellow-poplar and the oaks had more new reproduction in the cut openings than under the canopy. All species grew faster in the openings.

Normally the species composition of the stands that develop from the present reproduction will be satisfactory, but some stands on relatively moist sites will require special treatment. For optimum species composition, including a high percentage of yellow-poplar, specific cultural measures will often be required.

New Pacific Southwest Forest and Range Experiment Station

The Pacific Southwest Forest and Range Experiment Station is the new name for the former California Forest and Range Experiment Station. "Pacific Southwest" is now considered more in keeping with the station's enlarged geographical area which includes the State of Hawaii as well as California.

Formerly housed in Mulford Hall, the home of the University of California School of Forestry, the station moved its headquarters last month to 960 Addison Street, Berkeley. The address is still P.O. Box 245, Berkeley 1, Calif.

Response of Yellow Birch to Artificial Pruning

Darroll D. Skilling

THE INCREASING VALUE of high-quality northern hardwoods, especially yellow birch, has directed the attention of some foresters toward hardwood pruning as a means of improving timber quality. Very little information is available, however, on the response of yellow birch to artificial pruning. Can yellow birch be pruned without danger of decay entering the pruning wound? What effect does pruning have on the growth rate of pruned trees?

To answer these and other important questions related to yellow birch pruning, a study was initiated in 1947 by the Lake States Forest Experiment Station.[1] The objectives of this study were:

1. To compare the growth rate of pruned and unpruned trees.
2. To measure the length of limb-free bole on pruned versus unpruned trees.
3. To determine healing rates for pruning wounds of various sizes.
4. To evaluate the importance of epicormic branches which may develop after artificial pruning.
5. To evaluate the effect of artificial pruning on the development of lumber defects such as ingrown bark and unsound branch stubs.
6. To determine the importance of the heartrotting fungi which might develop following pruning.

FIG. 1.—Twenty-year-old stand of northern hardwoods on the Upper Peninsula Experimental Forest. Tree No. 1 in the foreground is part of the pruning study.

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FIG. 2.—Closeup view of tree No. 1 before pruning. The sharp-angled lower branches would have persisted for several years if they had not been removed artificially.

Description of Pruning Treatment

Trees for the study were selected from a 20-year-old even-aged stand of northern hardwoods, located on the Upper Peninsula Experimental Forest in Upper Michigan. Yellow birch trees composed approximately 4 percent of the stand, which

FIG. 3.—Tree No. 1 after pruning. Clear bolt length in 1957 was 20 feet.

[1]Acknowledgment is given to LaMont G. Engle who planned and established this study, and to the personnel of the Upper Peninsula Forest Research Center at Marquette, Mich., who have maintained the study to date.

TABLE 1.—SUMMARY OF YELLOW BIRCH SAMPLE TREE DATA

Item	Pruned trees	Unpruned trees
Number of trees	24	8
Av. d.b.h., 1947 (in.)	3.9	3.6
Av. d.b.h., 1957 (in.)	5.8	5.4
Av. total height, 1947 (ft.)	34.0	32.6
Av. total height, 1957 (ft.)	50.4	50.1
Av. clear length before pruning (ft.)	10.5	12.1
Av. clear length after pruning (ft.)	17.8	12.1
Av. clear length in 1957 (ft.)	19.4	14.5
Number branches cut per tree	8.3	

had a density of approximately 1,400 trees per acre. At the time of pruning the stand averaged 3.1 inches in diameter and 35 feet in height. A general view of the study area is shown in Figure 1.

A total of 35 dominant and co-dominant yellow birch trees were selected for study. Of these, 25 were pruned and 10 were left as unpruned checks. During the 10-year study period, natural mortality reduced these figures to 24 pruned and 8 unpruned trees.

During March of 1947 the trees were pruned to an average height of 18 feet by means of saws with extension handles. Figures 2 and 3 show two views of a typical yellow birch before and after pruning.

At the time of pruning, the following information was recorded for each tree: Number of branches pruned, total height, d.b.h., clear bole length before and after pruning, and tree crown class. Subsequent measurements were taken of total height, d.b.h., crown class, clear bole length, and epicormic sprouting. A summary of these data is shown in Table 1.

Methods

In the fall of 1957, 11 growing seasons after treatment, 13 pruned and 5 unpruned trees were selected for a dissection study of wound healing. The unpruned trees were chosen to correspond as nearly as possible to the pruned trees in both crown class and stem diameter. Furthermore, an attempt was made to include those with sufficient wounds of various sizes to indicate any significant differences. Actually the sample trees had 70 pruned and 104 unpruned branch wounds.

The sample trees were then cut, and a section of the bole around each wound was removed. Photographs were taken of the exterior characteristics of each wound. A radial cut was made through the center of each branch scar, and photographs were taken of the wound-healing process. The following wound-healing characteristics were measured: Rate of healing, production of clear wood after healing, and establishment of lumber defects and decay organisms.

In addition, all of the 32 sample trees living in 1957 were analyzed to determine the influence of pruning on subsequent tree growth, development of limb-free bole, and epicormic sprouting.

Of the 70 pruned branches, 65 were recovered in the dissection operation.

Results

Pruning yellow birch to 50 percent of total height had no appreciable influence on subsequent tree growth. As can be seen in Table 1, the unpruned trees grew an average of 1.8 inches in diameter during the 10-year period, while the pruned trees grew 1.9 inches. Averages for height growth were also very similar: Unpruned trees grew 17.5 feet during the 10 years as compared with 16.4 feet for the pruned trees.

The effect of pruning on development of clear bole length was still evident in 1957. The pruned trees were free of limbs to a height of 19.4 feet, while the unpruned trees had 14.5 feet of clear bole.

To determine the effect of wound size and tree growth rate on the period required for artificially pruned wounds to heal, each wound was measured for size, number of years needed to heal over and produce clear wood, and average growth rate of the tree during the healing period. The results of this analysis are shown in Figure 4.

Wound-healing rate was correl-

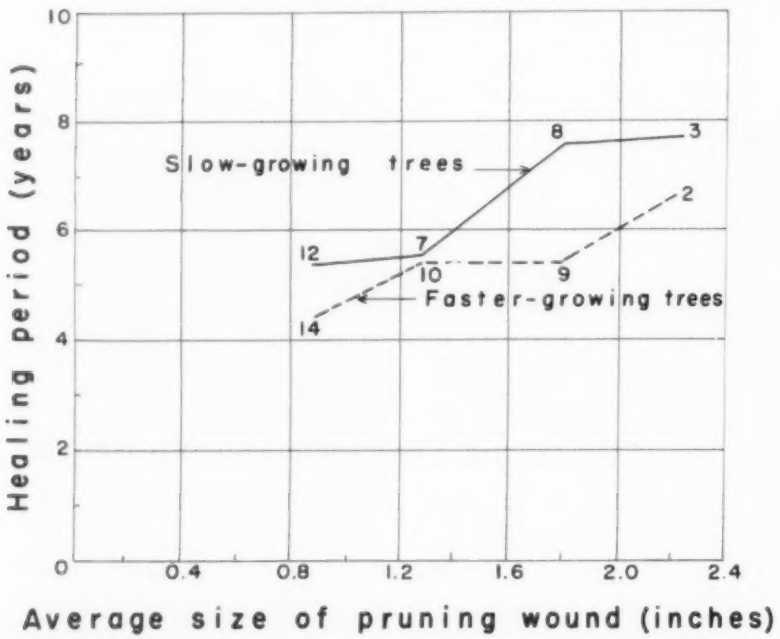

FIG. 4.—The influence of wound size and tree-growth rate on wound healing of artificially pruned yellow birch. Wound size was determined by measuring the vertical diameter of the pruning wound. Wound size data were combined by 0.4-inch classes. The "slow-growing trees" had an annual radial growth of between 0.04 and 0.09 inch; the faster growing trees, 0.10 to 0.20 inch.

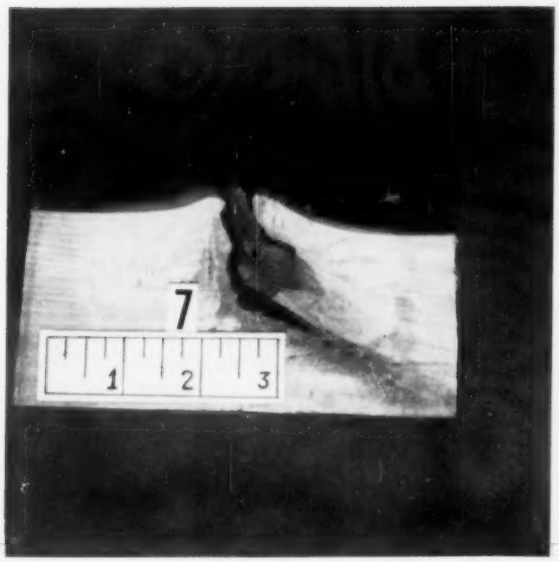

FIG. 5.—Natural pruning in yellow birch. These dead limbs are eventually overgrown, but not until several years' growth of future lumber has been degraded.

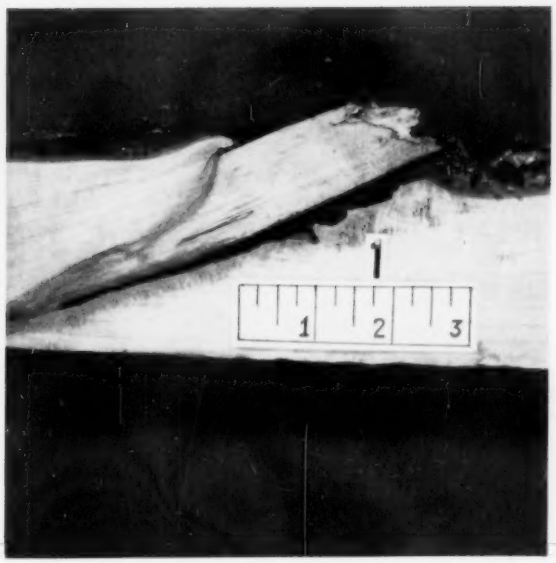

FIG. 6.—This yellow birch branch has been dead for 10 years. Sap rot fungi, established in the remaining stub, will result in an unsound knot.

ated with both tree-growth rate and wound size. A 1.0-inch pruning wound required approximately 4½ years to heal on the faster growing trees as compared with 5½ years on the slower growing trees.

The profuse development of epicormic sprouts could eliminate any beneficial effects of artificial pruning. Of the 24 pruned trees examined, 8 developed one or more sprouts during the first 2 years following pruning, but none of these sprouts was alive in 1950. This suggests that epicormic branching on trees of this type and under these stand conditions is a minor factor and for all practical purposes can be disregarded.

During the dissection of both natural and artificially pruned branches, considerable attention was given to any lumber defects which developed during healing. Naturally pruned branches showed a high proportion of typical lumber defects. The most important of these were relatively long, unsound branch stubs, ingrown bark, loose knots, and local decay pockets. Examples of these defects are shown in Figures 5 and 6.

The dissection of artificial pruning wounds showed clearly the results of both good and poor prun-

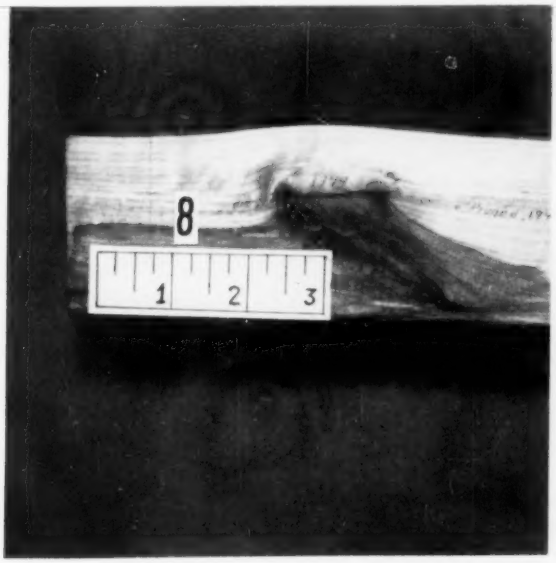

FIG. 7.—Artificial pruning of a branch 1.3 inches in diameter on yellow birch. This wound was completely healed within 2 years.

FIG. 8.—Poor pruning practice in yellow birch. Because of the large wound size and lack of flush pruning, 10 years were required for wound healing.

ing practices. In all cases where branches under 2.0 inches in diameter were pruned flush with the bark, the wounds healed rapidly with no resulting lumber defects (Fig. 7). However, when very large branches were pruned or if the branches were not pruned flush with the bark, defects did occur.

Figure 8 shows a wound where the large size of the branch and the length of the branch stub left delayed the healing. As a result, when the cambium grew beyond the stub, a heavy callus formation with recurved bark was present. As this spread over the wound, ingrown bark resulted. Although the wound eventually healed over, several years' production of clear wood was lost.

No heart rot fungi were found in any of the artificial pruning wounds. Although several of the branches were dead at the time of pruning and were more or less decayed, this had been caused by sap rot fungi and was limited to the exposed wood in the wound. The decay did not advance into the adjacent parts of the stem as would have happened if heartrot fungi had become established before the pruned stub was healed over.

Summary

The results of this study indicate that yellow birch will respond favorably to artificial pruning. Artificial pruning to 50 percent of total height had no effect on diameter or height growth. Pruning did increase clear bole length, and this effect was still present 10 years later.

Wound healing rate was related closely to both wound size and tree-growth rate. Small wounds (under 2.0 inches) on rapidly growing trees healed in the shortest time.

The few epicormic branches which developed following pruning were short-lived. Three years after pruning, no live epicormic branches were present on any of the pruned trees.

Lumber defects, such as ingrown bark, loose knots, and long, unsound branch stubs, were found in a high proportion of natural pruning wounds. Artificial pruning wounds developed none of these defects under good pruning practices. However, where large branches were not pruned flush with the bark, ingrown bark developed during healing. This indicated the importance of careful flush pruning. In no case was there any evidence that artificial pruning encouraged the development of decay.

Concentrated or Diluted 2,4,5-T as a Supplement to Girdling?

John J. Stransky

THIS ARTICLE reports on tests installed to determine whether full-strength 2,4,5-T concentrate, applied in a fine spray, would control sprouting and hasten crown kill of hardwoods girdled by ax or machine. An earlier study evaluated the effect of 2,4,5-T on cut stumps (*2*).

A supplementary chemical treatment is needed where vigorously sprouting hardwoods are girdled to release small seedlings, or where, as in east Texas, sprout control is essential to conserve limited moisture (*1,3*). An effective concentrate would reduce the bulk of liquid enough so that the silvicide could be carried and applied by the ax man or operator of the girdling machine, thus eliminating the heavy transportation costs and separate application required with standard dilutions.

THE AUTHOR is on the staff of the Southern Forest Experiment Station, Forest Service, U. S. Department of Agriculture, East Texas Research Center, maintained in cooperation with the Stephen F. Austin State College, Nacogdoches, Texas.

Design[1]

Post oak (*Quercus stellata* Wangenh.) and sweetgum (*Liquidambar styraciflua* L.) were chosen as test species because of their prevalence as weed trees on upland pine sites and because both sprout prolifically when girdled. In some areas sweetgum has also shown a tendency to produce enough callus growth to bridge the shallow cut made by the power girdler.

The study was conducted on upland pine-hardwood sites within the Stephen F. Austin Experimental Forest, near Nacogdoches, Texas. Soils are sandy loams overlying clay, and fairly representative of the better Upper Coastal Plain sites in east Texas. Study trees were of two d.b.h. classes, 3.6 to 5.5 inches and 5.6 to 7.5 inches. All had single stems and were judged free of underground connection with their neighbors.

Girdling was either by ax, in which case a standard double-hack girdle was cut, or by the "Little Beaver" power girdler, produced by the Haynes Manufacturing Company Livingston, Texas. This gasoline-powered machine employs a flexible shaft to power a cutting head which produces a smooth, rounded incision about ¾ inch wide. Properly used, it cuts through the bark and well into the sapwood, completely severing the cambium.

The chemical was a commercial preparation of 2,4,5-T, Dow Esteron 245, containing 42.5 percent propylene glycol ether ester by weight (4 pounds acid equivalent per gallon). The dilute solution was made up with Diesel oil, in proportion of 1 to 50, and was painted on the trees with a brush. The concentrate was applied to both ax and machine girdles from a plastic

[1] This study was designed and partially installed by T. A. Harrington.

squeeze bottle which dispensed a very fine spray. Both dosages were applied in such quantity as to give approximately equal amounts of 2,4,5-T acid to each tree.

The main installations, in April 1955, subjected sweetgums and post oaks to ax and power girdling without chemical, with dilute chemical, and with the concentrate. On each of the two species the six treatments were randomly applied, so that ten trees in each of the two size classes received each treatment. There were three replications of the treatment pattern.

Since other workers (*3, 6*) have found seasonal differences in response to silvicides, parts of the experiment were replicated in January, July, and November 1955. Five sweetgum trees were treated per size-treatment group. Treatments were limited to power girdling with dilute, concentrated, and no chemical. There were three replications each season, as in the main study.

The amount of concentrate or equivalent applied in each treatment is shown in Table 1.

TABLE 1.—CONCENTRATION OR EQUIVALENT PER TREATMENT

Season of installation	Species	2,4,5-T concentrate per tree	
		As concentrate	As dilute solution
		Cc	*Cc*
Winter	Sweetgum	1.3[1]	1.0
Spring	Sweetgum and post oak	.9[1]	1.0
Summer	Sweetgum	1.0	.7
Fall	Sweetgum	1.0	1.0

[1]Thinned 50-50 with Diesel oil to facilitate application in low temperature. This slight dilution produced results comparable to the full-strength concentrate and was not distinguished in the analysis.

TABLE 2.—AVERAGE PERCENT OF SWEETGUM AND POST OAK TREES CROWN-KILLED AND COMPLETELY DEAD TWO YEARS AFTER TREATMENT IN APRIL 1955

Treatment	Crown-killed with and without sprouts	Crown killed without sprouts
	Percent[1]	
No chemical		
Power girdle	75	40
Ax girdle	90	46
Mean	85	42
Concentrated 2,4,5-T		
Power girdle	99	55
Ax girdle	96	57
Mean	99	56
Dilute 2,4,5-T		
Power girdle	99	87
Ax girdle	100	86
Mean	100	87

[1]Mean values weighted by arc sin transformation.

All trees were inspected one and two full growing seasons after being treated. Crown condition, number of sprouts per tree, and length of dominant sprout were criteria for determining treatment effectiveness. This report is based on the second year's data.

Method of Girdling

Without chemicals, ax girdling killed crowns of 90 percent of treated trees, significantly more than girdling with the machine, which killed 75 percent (Table 2). The difference was greatest in post oak; there tops of all ax-girdled trees died within two years. With chemicals, the two girdling methods were substantially equal, both in top-kill, which consistently exceeded 90 percent, and in percent of completely dead trees, which varied with concentration.

All tops still alive after two years were damaged, and are expected to die eventually except in the few cases where the girdle has been bridged by callus tissue, or where the tree is sustained by root grafts. The difference between the two girdling methods, therefore, is believed to reflect promptness rather than completeness of kill. With both methods sprouting was excessive without chemicals.

Chemicals

All chemical treatments gave a highly significantly better topkill than simple girdling. Both concentrated and dilute 2,4,5-T were effective, killing the crowns of more than 97 percent of the treated trees.

While there was little difference between concentrated and dilute acid in top-kill efficiency, the concentrate proved to be a poor sprout inhibitor. In the April tests, the average percentage of completely dead trees was not high enough for the concentrate to be significantly better than simple girdling; in the seasonal test with sweetgum the complete kill percentages were identical (39 percent) for both of these treatments (Fig. 1). The dilute solution, with a complete kill of 87 percent on both species after spring application, and an average of 56 percent on sweetgum in the seasonal test, was significantly more effective, and provided acceptable sprout control.

Of the trees that remained alive below the girdle, those that received dilute acid applications developed fewest sprouts. Results with the concentrate were only a little better than those from simple girdling. The height of the dominant sprout follows a similar pattern, averaging about 0.8 foot shorter with dilute 2,4,5-T than with the other two treatments.

The superior effectiveness of the dilute solution suggests that the Diesel oil rather than the 2,4,5-T might be the effective agent. Studies by Campbell and Peevy (*1*), however, as well as informal tests in Texas, indicate that Diesel oil alone has little sprout-inhibiting quality. It appears rather that effective quantities of 2,4,5-T are translocated into tissues below the girdle only when diluted. This parallels experience with 2,4,5-T on cut stumps, where large quantities of dilute chemical were most effective (*2*). Apparently the rather viscous concentrate is not readily absorbed into the wood, while the thin Diesel-oil solution penetrates much more readily.

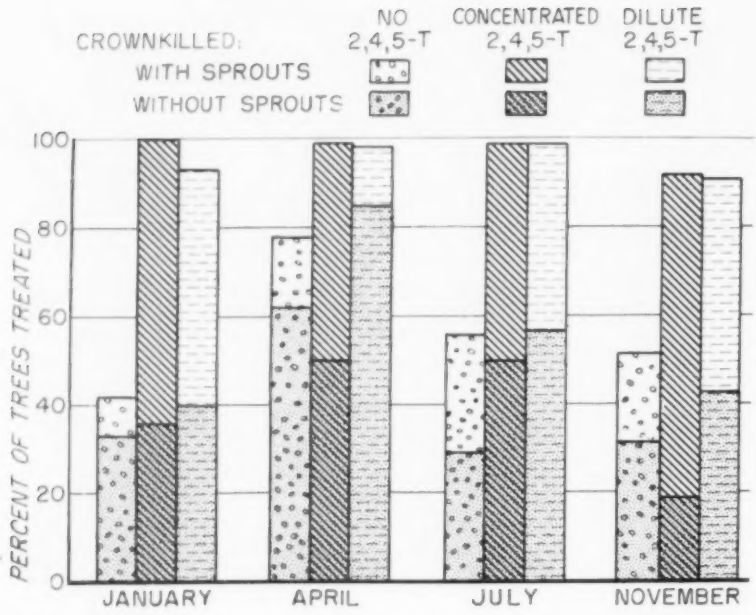

FIG. 1.—Crown kill and sprouting of girdled sweetgums, by season and treatment (average of ax and machine girdling).

Season, Species, Tree Size

In the sweetgum tests, spring treatments were most effective in both top-kill and inhibition of sprouts. Treatments in summer were better than those in fall and winter (Fig. 1). Similarly, on trees not completely dead, sprouts were fewest and smallest after spring treatment. While the differences between seasons were not statistically significant, they are consistent with those reported by other workers (*3, 6*).

Without chemicals about 75 percent of the post oaks sprouted after girdling as compared with about 40 percent of the sweetgums. The difference was not statistically significant, and is inconsistent with considerable experience which rates sweetgum the more difficult species to control.

The tests were confined to a rather narrow range of diameters—3.6 to 7.5 inches d.b.h.—because these size classes have generally sprouted most vigorously after girdling. Within this range, d.b.h. of tree was significant only in the percent of sweetgums top-killed in the seasonal test. Here smaller trees were top-killed more effectively than large ones. Differences were largest where no chemical was applied.

Conclusions

Ax girdling was significantly better than power girdling only in top-kill without chemical treatments. With chemicals there was no difference between ax and power girdling. Top-kill differences reflect promptness rather than eventual completeness of kill, since remaining tops are moribund.

All treatments involving 2,4,5-T resulted in significantly higher top-kill than girdling alone. Concentrated and dilute 2,4,5-T killed crowns equally well; the concentrate, however, proved to be a poor sprout inhibitor, while the dilute solution was very effective.

There was no significant difference between the response of sweetgum and post oak.

Within the limited diameter range of the tests, size of tree did not affect results significantly.

Dilute 2,4,5-T was most effective in reducing sprouting when applied in early spring, least effective in the dormant season.

It is evident that the saving in material costs and transportation of dilutent envisaged in the design of this study cannot be fully achieved by application of undiluted 2,4,5-T. Where promptness of top kill is a primary consideration, application of full-strength 2,4,5-T in cambium girdles may prove useful. Where both prompt kill and inhibition of sprouts are required, the chemical should be applied in dilute form.

Further tests are needed to determine whether some intermediate concentration of 2,4,5-T can be effective without being too bulky for use with a power girdler.

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Notes and Observations

A Soil-Depth Probe For Shallow Forest Soils

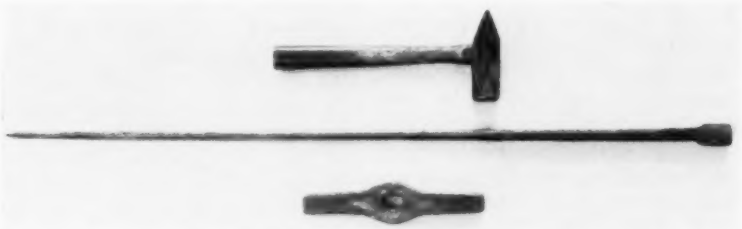

FIG. 1.—The soil probe developed by the Northeastern Station. It can be used to measure soil to depths of 3½ feet.

Depth is an important characteristic of forest soils. On shallow soils, tree growth is often related directly to soil depth. Then too, watershed behavior—the pattern of streamflow—is usually affected by the depth of the soil mantle.

For measuring soil depth, a number of tools have been devised. The soil auger and the open-tube soil sampler, designed mainly for examining soil profiles of farmlands, have commonly been used to measure depth down to 3 feet. The King soil-sampling tube has been used to measure depths of 6 feet or more.

However, these tools are not efficient for measuring depths of stony forest soils such as those found in the mountainous areas of West Virginia. The large diameters of the soil auger and the open-tube sampler make penetration difficult. Use of the King tube is limited because of its weight and the expense for replacing broken cutting points.

Often a large number of depth measurements are needed because the extremely variable topography results in drastic changes in soil depth over short distances. In addition, the generally stony nature of the soils necessitates that a number of measurements must be taken to insure reaching bedrock rather than just a large unconsolidated stone.

Therefore a need was felt for a depth-measuring tool to be used in such soils—one that is durable, reasonably light, and less tiring to use than the conventional tube- or auger-type samplers.

Stoeckeler and Thames[1] have developed an instrument for measuring soil freezing to a depth of 23 inches. Their device consists of a solid steel shaft ½-inch in diameter, fitted with a sliding drive hammer.

Now a somewhat similar but simpler soil probe has been developed by the Northeastern Forest Experiment Station's research center at Elkins, West Virginia. This probe, designed only to give depth measurements quickly and accurately in soils as deep as 3½ feet, consists of two parts: a solid steel shaft 3.8 feet long, ¾-inch in diameter at the top and tapered to a blunt point; and an extraction handle (Fig. 1). The shaft is graduated in feet and tenths. It is driven with a 3-pound hammer.

In field use, the extraction handle is first slid onto the shaft; then the shaft is driven into the soil until an obstruction—usually bedrock—is struck. If no obstruction is struck, the probe is driven in all the way. To extract the probe, the handle is pulled up and engaged on the square head of the shaft; and by twisting and pulling, the probe is pulled up. Because the shaft tapers, friction is quickly reduced and the probe comes out easily.

Where large rocks lie close to the surface, several measurements are taken to make certain that the depth recorded is to bedrock. The probe apparently pushes aside small rocks much more easily than a soil auger.

In developing the probe, it was found, after several trials with various types of steel rod, that properly annealed tool steel with a high carbon content was best suited for use in rocky soils. It was also found that a shaft separate from the extraction handle holds up better than one with the handle welded to it.

This probe has not been used in soils with hardpans. However, in areas where a highly developed pan is known to exist, it probably could be used effectively for measuring the depth of the soil to the pan. On the other hand, poorly developed and less resistant hardpans might prove difficult to detect.

The probe has been valuable for measuring soil depth for determining site index.[2] Where samples of the soil itself are required, or where the soil is deeper than 3½ feet, measurements must be made by other tools such as the King tube.

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[1]Stoeckeler, J. H., and J. L. Thames. The Lake States penetrometer for measuring depth of soil freezing. Soil Sci. 85: 47-50. 1958.

[2]Trimble, G. R., and Sidney Weitzman. Site index studies of upland oaks. Forest Sci. 2: 162-173, illus. 1956.

Growth of Slash Pine Plantation on Flatwoods in West-Central Florida

An excellent example of how well slash pine can grow is found in the Whitehead Plantation on the Florida National Forests. This 25-year-old plantation is located 20 miles southwest of Hosford, Florida in Liberty County on the Apalachicola Ranger District. On this district, the management plan calls for the growing of high quality sawtimber from slash and longleaf pine. The trees in this plantation are well on their way to fulfilling this objective. Two thinnings have been made to maintain the growth rate.

In the summer of 1935, a crop of field corn was grown on this site. After the corn was harvested, barnyard manure was spread over the field, and cow peas were planted. During January 1936, three-year-old slash wildling stock was lifted from a nearby area and planted among the peas. The trees were lifted with Council seedling lifters and planted in holes dug with post hole diggers. Planting conditions were far from ideal as water stood on the site several days and a hard two-day freeze occurred.

In 1939, a survival check revealed the average survival to be 77 percent. Replanting was done in 1939 to fill the spots caused by the 23 percent mortality. This replanting did not help the stand as these trees were soon crowded out by the original planting. These replants can be seen today as 3- and 4-inch trees among 12-inch trees.

In 1946, another survival check was made. This resulted in a 73 percent survival figure which includes replants.

The cost of planting which averaged $12.77 per acre was unusually high for that time because the seedlings were handled carefully and the rows planted with great precision. The plantation was laid out in seven plots with spacing ranging from 5x5 to 10x10.

In 1947, when it became evident the growth in plots 4 and 5 was slowing down, those plots were thinned. The thinning reduced the basal area in plot 4 from 180 square feet to 100 square feet. Plot 5 was reduced from 135 feet to 80 square feet. A total of 52.2 cords were sold at a price of $1 per cord.

In 1952, the trees in those plots not thinned in 1947 were becoming crowded and growth was slowing down. These plots were thinned and yielded 414 cords from 48 acres for an average of 8.6 cords per acre. The purchaser paid $4.72 per cord which resulted in a return of $40.59 per acre. Pulpwood was the product in each thinning.

The latest thinning was made in 1956 when again it became evident the trees were too crowded and growth was slowing down. A total of 640 cords were removed from 51.8 acres for an average of 12.3 cords per acre. The purchaser paid $8.17 per cord for this pulpwood. At that time, this was the highest price paid for pulpwood in this area. This cut returned $100.49 per acre.

The results of these thinnings, plus the present volume of the plantation, are shown in Table 1.

Thus, this plantation, 25 years old, has paid for the original establishment cost by ten fold. The plantation is in excellent condition for future growth. The trees in plots 1, 2, and 3 average 10-14 d.b.h. and are 70-80 feet tall. Trees in plots 4, 5, 6, and 7 average 8-10 inches d.b.h. and are 60-70 feet tall.

What are the plans for the future? After the cutting was completed in 1956, it was apparent that another thinning would have to be made in three to five years. Therefore, plans have been set up to thin plots 1, 2, and 3 for sawlogs in 1959. Plots 4, 5, 6, and 7 will have another pulpwood cut in 1961.

The difference in spacing in the plots has produced a variation in the form and quality of the trees. In plot 1, most of the trees still have not healed over the limb scars on the butt log. Deal limb stubs are very evident in the second log. In plot 4, the butt log is clear, and the second log is 60 percent clear. However, the average diameter in plot 1 is 12 inches d.b.h. while the average diameter in plot 4 is 8 inches. The best combination of quality and diameter seems to be in plot 7 with 8x8 spacing. Most of the butt logs in this plot are clear, and the average diameter is 10 inches. Many high quality poles could be cut from this plot.

This, then, is Whitehead Plantation. It shows what slash pine can do on a flatwoods site, specially prepared, to be sure, but otherwise typical, in west-central Florida. An 8x8 spacing can produce sawtimber stands in 35 years with three intermediate thinnings for pulpwood. High quality poles can also be produced. There are thousands of acres in Florida that can support this type of timber stands.

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U. S. Forest Service

[1]The author is currently on the supervisor's staff of the Texas National Forest, Lufkin.

TABLE 1.—RESULTS OF THINNINGS AND PRESENT VOLUME

Plot no.	Spacing	Acres in plot	1947 Yield per acre	1952 Yield per acre	1956 Yield per acre	1957 Volume per acre	Total volume production to date (to nearest whole cord)
					Cords		
1	10.5x10.5	19.7		7.6	12.2	36	56
2	9x10	15.5		4.0	12.4	31	47
3	8x10	8.8		13.6	11.6	29	54
4	5x5	1.9	16.3		12.9	29	58
5	6x6	1.9	15.7		13.1	32	61
6	7x7	2.1		11.4	13.2	35	60
7	8x8	1.9		13.6	13.3	32	59

Sulfur Dioxide as a Defoliant of Chaparral Plants

CHAPARRAL, the brush cover native to many southern California watersheds, transpires large amounts of moisture from the soil. This vegetation type would be a more valuable watershed cover if its water use could be diminished without adding to the erosion hazard. Such a decrease might be accomplished by a properly timed defoliation.

Early in 1957, sulfur dioxide was chosen as the defoliant most suitable for several small scale tests at San Dimas Experimental Forest.[1] A successful defoliation process was developed and tried on a number of native shrubs and small trees. This report tells the gross reactions of these plants, tested in situ. Sulfur dioxide gas was a very effective defoliant, and so far, plants defoliated early in the growing season have survived better than those treated later in the summer.

Procedure

The chemical is inexpensive and easily applied. The materials used were a 12- by 22-foot plastic automobile cover ($12.50), a 2-pound pressure can of liquid sulfur dioxide with release valve ($4.00), a glass 25-c.c. graduate, and a small glass dish. The shrub or tree to be defoliated was tightly enclosed within the plastic cover (Fig. 1).

The amount of air within the cover was approximated from outside measurements of average height, width, and depth of the enclosed plant. A glass dish was placed on the ground beneath the plant and liquid sulfur dioxide was quickly measured into the graduate and poured into the dish. Uniformly good results were obtained by using 1 c.c. of liquid sulfur dioxide per 15 cubic feet of enclosed air (approximately 1,000 p.p.m.).[2] The cover was immediately closed and the gas held around the plant for 10 minutes. Plants accidentally treated for only 5 minutes appeared to have an equally extensive leaf kill.

Sulfur dioxide is not pleasant to use; it has a sharp odor and causes a burning sensation when inhaled or in contact with the eyes. These discomforts are minimized by working quickly, upwind from the gas, and by using the plastic cover as a shield.

Effects on Plants

The effects of the gas were apparent immediately on broad-leaved plants (Table 1). The leaves had a "bruised" appearance. On a hot day browning was apparent 4 hours after treatment. Dead foliage still clung to the treated plants 6 months after regrowth had occurred.

Regrowth occurred from terminal and lateral buds on crown perimeters of the shrubs least damaged by sulfur dioxide. Buds usually broke 1 or 2 weeks after treatment. The more susceptible plants regrew from lateral or adventitious buds on larger stems well within the crown. Low growing plants, such as white sage, *Salvia apiana*, recovered from adventitious buds near the root collar. The new leaves were smaller than the originals, fewer in number, and of a lighter green than older leaves on adjacent plants of the same species.

In spring and early summer plants were succulent and grew rapidly. During this period sulfur dioxide gas damaged twigs less than ¼-inch in diameter, terminal and lateral buds, flowers, and immature fruits. These undesirable side effects may be avoided by defoliating after the plants have become sclerotic during the mid-summer stage of growth. At this stage, well hardened 1-year-old leaves of evergreen plants are more susceptible to sulfur dioxide gas than younger leaves. Completely negative results may be obtained when plants in

[1] Maintained by the Forest Service, U. S. Department of Agriculture, in cooperation with the California State Department of Natural Resources, Division of Forestry.

[2] Other investigators using a variation of this technique include:

Hill, G. R. and Thomas, M. D. 1933. Influence of leaf destruction by sulfur dioxide gas and by clipping on alfalfa yields. Jour. Plant Phys. 8:223-245.

Southeastern Forest Expt. Sta. 1951. Annual Report, U. S. Forest Service. Station Paper No. 22:23-24, illus.

FIG. 1.—Research forester at San Dimas Experimental Forest measures liquid sulfur dioxide for defoliation test.

late summer dormancy are treated with sulfur dioxide gas. These developmental stages are not concurrent in mixed stands, their occurrence in individual plants apparently being governed by both genetic and site factors.

Grieve[3] encountered a similar pattern of behavior while measuring transpiration of the sclerophyllous scrub forests of western Australia. He found the stomata of young leaves to be more responsive to environmental conditions than those of older, more heavily cutinized leaves. As temperatures increase, stomata close in young leaves but remain open in older foliage. As moisture availability continues to decrease, most of the stomata are eventually closed by guard cells or by curling of the leaf.

Grieve's work explains the poor leaf kill of September on *Ceanothus crassifolius* and *Rhus laurina* and the seemingly erratic behavior of *Pinus coulteri* (Table 1). In mid-September the soil was extremely dry and undoubtedly the stomata of the broad-leaved plants were nearly all closed. The Coulter pine treated in August was a small one (24 inches high) growing with adequate soil moisture. It was probably transpiring vigourously with all stomata open. Sulfur dioxide did not damage pines treated on October 1 before the fall rains. Variable effects were obtained when pines were treated on October 20. Three inches of rain had fallen, but air temperatures were less than 50° F. A complete needle kill resulted when Coulter pines were treated in November, when soil moisture was high and air temperature about 65° F. Apparently, environmental conditions must be conducive to open stomata if sulfur dioxide is to be effective as a defoliant.

TABLE 1.—RESULTS OF EXPOSING SELECTED PLANTS FOR 10 MINUTES TO 1,000 PARTS OF SULFUR DIOXIDE PER MILLION PARTS OF AIR

Species	Date exposed	Leaves killed	Damage to other parts	Recovery
		Percent		
Ceanothus crassifolius	May, July	95±	Heavy	Fair
Ceanothus crassifolius	September	50	Slight	Fair
Rhus ovata	May, July	95±	Moderate	Excellent
Adenostoma fasciculatum	July	100	Moderate	Excellent
Arctostaphylos glandulosa	July	100	None	Fair
Rhus laurina	August	100	Slight	Excellent
Rhus laurina	September	5	None	Full
Quercus dumosa	August	100	None	Good
Eriogonum fasciculatum v. *foliolosum*	August	100	Heavy	Fair
Artemesia californica	September	100	Heavy	Fair
Salvia apiana	September	100	Heavy	Fair
Pinus coulteri	August	100	Dead	None
Pinus coulteri	October 1	None	None	
Pinus coulteri	October 20	60-100	None apparent	(1)
Pinus coulteri	November	100	None apparent	(1)

[1]Recovery symptoms will not be evident until new needles emerge the following Spring.

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[3]Grieve, B. J. 1956. Studies in the water relations of plants. 1-transpiration of western Australian (Swan Plain) sclerophylls. Jour. of the Royal Society of Western Australia. Vol. 40.

Storage of Black Spruce Seed For 19 Years

Germination tests made at the Hugo Sauer Nursery indicate that black spruce (*Picea mariana*) seed can be stored for long periods with little loss of viability.

The cones were collected on the Chequamegon National Forest in Wisconsin in 1936, and the seed was extracted at the Hugo Sauer Nursery that same year. The seed was stored in airtight cans in an insulated seed storage building where the temperature varied from below freezing in winter to a high of approximately 75°F. in summer.

The initial germination percent is not known. In 1945 the percentage was 94 percent and in 1953 it was 92 percent. The last test was made in 1955 when one sample tested 74 percent and another 80 percent. The seeds in the early tests received cold-stratification treatment before sowing; the seeds in the last test received a cold soak treatment before sowing.

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Points of View

Comments on Genetic Variation Within Geographic Ecotypes of Forest Trees and Its Role in Tree Improvement

In their article[1] published in the November 1958 JOURNAL OF FORESTRY, Wright, Bingham, and Dorman evaluate the literature on selection and breeding within geographic races of forest trees in the light of stated, rigorous statistical concepts. They consider the published evidence sufficient to permit optimistic estimates of the possible rates of genetic improvement from intensive selection and breeding within races for Scotch pine, Norway spruce, and western white pine. With other species, they consider extremely few published experiments adequate to prove the existence of genetic variation within races, and even fewer adequate to permit estimating its extent. They state that these experiments are also inadequate to *disprove* genetic variation, but they question the efficiency of current selection and breeding programs based on the limited data available for most species.

Wright, Bingham, and Dorman's analysis of the literature may be a useful antidote for the extravagant expectations of some concerning the possibilities of selection and breeding. To those engaged in forest genetics research, their evaluation is certainly a timely challenge to design experiments more rigorously and sensitively, to analyze and release results more promptly, and to publish such results in more adequate detail. We question, however, whether their article has not overemphasized certain points by quoting from literature, while it understated or omitted others. Such an approach may give the reader an entirely too pessimistic picture of what may be achieved in forestry through the use of genetics, and it ignores a vast amount of available information that, even though not in the ideal form the authors have set up, is definitely useable.

The article in question seems to imply that if variation is present in a population, it is automatically attributable to environment until proved to be genetical. Many foresters assume that this is true; so, apparently, do some persons working in forest genetics. This assumption is, however, unwarranted. Proof that a character variation is caused by environmental differences is just as essential as proof that a character variation is caused by genetic differences. It seems to us that the authors have dismissed from consideration many published reports of strong and important indications of genetic variation within races, on the insufficient ground that simply because certain environmental influences probably were at work, *all* the observed variation *must* be assumed to be environmental in origin. As most of these unconsidered papers point out, lack of demonstrable environmental effects does not prove, per se, the importance of the hereditary effects. Certainly, however, such instances give us many good leads in our rating of characteristics and their potential value in a breeding program.

A questionable statement of the article is that "variation between is significantly greater than that within geographic origins." It must be noted that the authors do not specify the characters for which this "rule" is presumed to hold. It undoubtedly does hold true for characteristics that vary widely in association with variations in latitude, altitude, temperature, or soil moisture. It does not hold true for many other characteristics, some of great economic importance. Wood property variability is an example. The same pattern is encountered time after time; the variability between trees, relative to the variation between sites, is always large. Does this not indicate that site differences have little effect, while individual tree differences are great (*4*, *9*)? How about bole straightness of loblolly pine? It is quite different between trees; yet little average difference has ever been demonstrated between geographic areas. Many other examples could be given, both of economic and non-economic importance. One of the best of the latter is seed characteristics. We contend that the authors err in disregarding such relationships.

The undersigned commentors have in their files over 150 papers that deal with inheritance of specific characters. The sum total of information in these is of great value, even though few of the papers conform to the exacting standards proposed by the authors of the article. The tree breeder must use *all* available sources of information and evaluate them if he is to have the complete background upon which to build his work. For example, we question the omission from Table 2 of the work of McWilliam and Florence (*5*). It may be open to some theoretical criticism because the trees came from plantations. Both theoretically and practically, it does demonstrate that the form and growth in slash pine stands can be improved by selecting the better trees for seed sources, and that an even greater improvement can be achieved by controlled pollination. Can we overlook an increase of from 72 to 139 acceptable crop stems per acre (160 possible) obtained by going from "routine"[2]

[1] Wright, Jonathan W., R. T. Bingham and K. W. Dorman. Genetic variation within geographic ecotypes of forest trees and its role in tree improvement. Jour. Forestry 56:803-808. 1958.

[2] "Routine" seed in this case was from the best 160 stems per acre in the earlier plantings, probably far superior to the trees which have supplied most of our seed needs in the past.

collection to wind-pollinated seed from the 10 best parents, or a further increase to 160, the maximum possible, from controlled crosses among the 10 best? (The numbers of *plus* stems per acre in each category were 5, 33, and 100 respectively.) The work of Barber et al. (*1*), Ehrenberg and Gustafsson (*3*), Mergen (*6*) and Ruden (*7*) all show similar findings, and most of their results are based on progeny tests.

In eliminating accounts of seed orchard establishment, the authors fail to point out that all established seed orchards in the South are being progeny tested, or will be as soon as sufficient control-pollinated seed can be produced, and that some orchards include material which has already been progeny tested and proven superior.

In their article, the authors state that few of our forest trees seem to be of hybrid origin and because of this, using crop plants as an example, "the built-in variability and rate of progress following selection within any local population are likely to be much less than in the case of the hybrid crop plants."

The emphasis on lack of hybrid origin of our forest trees seems to us to be misplaced. Who can say which of our trees are of hybrid origin? It should also be noted, in comparing the genetic variability within species of trees to that of crop plants, that agriculturists have, for hundreds or thousands of crop generations, subjected most crop plants to a form of selection, which has reduced the variation within local populations and, incidentally, resulted in a much-improved crop. Therefore, hybridization was needed to restore the variation. In contrast, all of our forest trees are essentially wild populations, and at present contain a great amount of variability. Certainly some species are more variable than others, as seen in the contrast between red pine and loblolly pine, but most of our commercially important species unquestionably seem variable enough to justify selection.

The discussion of individual tree selection and crossing programs in comparison with provenance tests implies that we know how to sample geographic distributions of species and even stands to locate the best provenance quickly and easily. Until we have more information from studies now underway on variation of progenies from within stands and comparisons between stands, we cannot be sure that a seed collection made for provenance testing is representative of a "geographic race," or merely represents one stand or a few trees on a particular site. The statement that first generation progeny tests of individual selections need more care in design than provenance tests "because the differences to be detected are smaller" is not consistent with the argument used against Rudolf's work with red pine, nor is it consistent with current reports of work in the southern pines.

Wright, Bingham, and Dorman state, "The greater part of the forest planting now being done in the world involves non-indigenous ecotypes." They illustrate this by the statement that "It includes most of the Baker County (Florida) slash pine . . . planted in the southeastern United States . . ." It is true that a great deal of the early planting of slash pine was with seed from Baker and Columbia Counties. But what makes such planting non-indigenous? All information published to date shows geographic races of slash pine to be practically non-existent. Therefore, how can slash, whether from Baker County or elsewhere, be considered non-indigenous? Can any statement of non-indigenous origin be made for planting within the species' natural range until ecotypes have been found to be present? Can we take a state or county line and call material beyond this line non-indigenous? Further, present practices, as typified by Georgia, largely call for seed collection from local stands. Many of these are natural stands and even those collected from original Baker County sources can hardly be called non-indigenous, as pointed out above, as long as the planting is within the natural slash range. With the removal of the bulk of slash pine from the non-indigenous category, does the authors' statement hold that the greater part of forest planting now being done is with non-indigenous species?

The authors question the rule that is presently being used by most of us, i.e., that until you know better, it is best to use local seed sources. They state that "Experimental evidence indicating that local races are best is weak." Following the next sentence, which deals with Rudolf's red pine study, they state, "On the other hand, the phenomenal success of exotics in Australia . . . shows the possibilities of the use of non-local stock." We interpret this last statement as supporting the prior one about the use of local races. Yet the statement about Monterey pine cannot be used in support of the weakness of local races, since there are no local races in Australia to compare it with. It would seem unwise in a discussion of the worthwhileness of local races within a species to suddenly jump to a discussion of the reaction of different species in an area where there are no local races, or species, that they can be compared with.

Wright, Bingham, and Dorman reject a large number of papers because they have statistical or other defects, or because they do not involve progeny tests. Yet they have a section entitled "From Other Types of Experiments." In this section there is a discussion about cone opening in jack pine, in which they drew certain conclusions about the effects of natural selection. But in line with their rigid criteria previously set up, is there proof that the parental stands were unburned, or that the parents of these parental stands were burned? Can a sample of three stands eliminate the variables of age, site, stand density, and microclimate? How much is "much greater"? Was the variation between cones opening on individual trees and between trees within the stand determined? And where is the fulfilling of requirement No. 1 that "conclusions should be supported by evidence

from seedling tests or clonal tests"? Possibly *all* these questions were answered—anyway, we hope so—but this certainly seems less reliable as a research technique than many of those rejected from the authors' exclusive "Can Be Trusted" club.

A last point which we feel should be brought out concerns the use of intra-ecotypic variation in naturally reproduced stands. Natural regeneration is widely used, and although the coefficient of environmentally induced variability may be high, is there proof that the heritability of all tree characteristics is low? On the contrary, evidence indicates that the heritability of certain characteristics may be relatively high in some species (*2, 8*). The attainment of a selection differential of two standard deviations would be feasible in the southern pines. "One out of 44" would leave us at least 12-14 trees per acre for natural regeneration if we had accepted 600 seedlings per acre as adequate initial stocking. One has the entire rotation to select and favor the desired trees for reproduction.

We deprecate the attempted separation of intensive silviculture and genetic selection. Genetics should be a working tool of every silviculturist. Whether he recognizes it or not, he makes his decisions on the phenotypes present, and the phenotype is generally accepted as the sum of the genotype and the environment. Much confusion already exists because of the belief held by some that the application of genetics to forestry is a separate and distinct field of endeavor. It is recognized that the work of a geneticist in research or that of a tree-breeder is quite different from that of a timber marker, but the difference in choosing a tree to reproduce a stand or choosing a tree for breeding purposes is only in the time and intensity of selection. Genetics is not to be reserved solely for the regeneration cutting as implied.

The article upon which we comment is an important contribution to the literature. However, we believe it would have been still more constructive if more numerous independent, even though individually less rigorous, research results had been considered. Far less rigorous observations than those we have in mind led to great improvement in agricultural crops long before the word "genetics" was coined.

While we agree with the authors that genetic action programs cannot operate at top efficiency until we know more about inheritance in forest trees, we challenge the implication that action should be postponed until a vast array of rigorous experiments have been completed. Forest genetics is a valuable tool that should be put to use immediately by the silviculturist in the wisest manner that our present knowledge permits. If we can, despite our ignorance, make some gains while more basic information is being obtained from well-designed studies, we should do so. The challenge is to the researchers to make the basic information available more rapidly, not to the practitioners to abstain from using the best leads they already have.

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Comments on the Cost of Aerial Photography

We would like to commend Mr. Philip Langley for his article "Aerial Photography as an Aid in Insect Control in Western Pine and Mixed Conifer Forests."[1] At the Beltsville Forest Insect Laboratory we are intimately involved in the same type of work in eastern forests and have compared results with with those of J. F. Wear of the Pacific Northwest Forest and Range Experiment Station, Portland, Ore. in western forests. Many of our conclusions are similar—primarily those concerning aerial color photography for locating insect damaged timber.

We, too, have found that Anscochrome or Aerial Ektachrome are superior to black and white films for accurate location of beetle killed pines. Anscochrome is found to have better resolution properties and has the capacity for use under more adverse lighting conditions. Furthermore, the better resolution permits identifying not only beetle killed timber but also various degrees of insect defoliation to a fairly high degree of accuracy. Limited tests with camouflage detection film in eastern U. S. indicate that it is not as reliable as color film for

[1]Langley, Philip G. Aerial photography as an aid in insect control in western pine and mixed conifer forests. Jour. Forestry 57:169-172. 1959.

TABLE 1.—COSTS[1] FOR A 100 PERCENT SURVEY OF A 3,500-ACRE AREA USING COLOR PHOTOGRAPHY OF THREE SCALES

Photo scale	Cost[2] of photography	Cost[3] of processing	Cost[4] of interpretations	Total cost	Cost per acre
			Dollars		
1:3,960	204.50	34.63	122.04	361.17	0.102
1:7,920	67.64	23.77	47.98	139.39	0.039
1:15,840	49.23	21.59	16.22	87.04	0.025

[1]Cost to the federal government.

[2]Includes film and pilot and photographer salaries—no per diem or standby time. Photo airplane—Cessna 195. Photography cost includes film and direct aircraft costs (gas, oil, maintenance, and overhaul), insurance, and depreciation. Sost per airplane hour, $20.11, is taken from Cessna Aircraft Company operating cost data sheet.

[3]Includes processing chemicals, and salary for GS-7 technician to process films and edit and mark films with reference numbers.

[4]Determined by multiplying average interpretation time for three interpreters times the hourly rate of a GS-9 interpreter. Additional cost of relineation area boundaries has also been added.

TABLE 2.—COMPARATIVE COSTS (ESTIMATED) TO MAKE A 100 PERCENT SURVEY OF TWO TOWNSHIPS (46,080 ACRES) BY CONVENTIONAL GROUND METHODS, BY AERIAL COLOR PHOTOGRAPHY, AND BY AERIAL SKETCHMAPPING

Survey method	Expected accuracies	Man-days to complete	Total cost	Cost per acre
	Percent		*Dollars*	
Ground cruise[1]	100	1,728	$28,818.80	$0.6300
Color photography[2] (1:7,920)	80	9.0	6,206.34	0.1340
Aerial sketchmapping[3, 4]	62	1.4	91.00	0.0019

[1]Includes salaries, vehicle, travel, supplies, but assumes no per diem using local personnel.

[2]Includes commercial cost of photography, photo preparations, and photo interpretation.

[3]Includes salaries, plane rental with pilot of $25.00/hr., and materials.

[4]For plotting trees in groups, two or more trees per infestation. Ground cruise was found to have omissions but is assumed to be standard for comparison.

picking out beetle spots in winter photography. Furthermore, CD film is not readily available and must be purchased in large lot orders of 20 rolls or more.

Mr. Langley's paper, we feel, may mislead many of the readers into an exaggerated idea of the low cost of aerial photography. Two tables which are excerpted from an article, "Evaluation of Aerial Photography for Detecting Southern Pine Beetle Damage," by R. C. Heller, R. C. Aldrich and W. F. Bailey, which will appear in a forth-coming issue of *Photogrammetric Engineering* show some cost figures.

Table 1 is almost self-explanatory but please note that the cost per acre at a scale of 1:7920 is very close to Langley's scale of 1:8000 and shows a price of about 4 cents an acre as compared with Langley's price of 5 to 5½ cents an acre.

As is explained in the table, these are costs to the federal government. The film is purchased by the federal government at 40 percent less than retail price; no allowances are made for per diem or standby time; and there is no allowance for overhead or depreciation of office and photographic equipment. Naturally, in a government quotation there is no allowance made for profit or the risks taken in an enterprise so subject to vagaries of the weather. So that a more realistic cost estimate could be obtained, three reputable photographic companies were contacted in January 1958. The contractor was requested to quote a cost per acre for color transparencies at a scale of 1:7920 over an area approximately 46,000 acres (two townships). The quotations we received varied from 12.8 to 14.0 cents per acre and the average price is included in the color photography cost shown in Table 2; this figure also includes the cost of photo preparation and interpretation costs.

This price, we feel, is quite at variance with Langley's quoted price of 5 to 5½ cents per acre for a smaller tract of property (25,000 acres). It is an established fact that aerial photography decreases directly in price as the size of the property increases.

As mentioned earlier, the main concern in writing this note is to avoid misleading the reader with the conclusion that aerial photography is as cheap as the estimate shown in the article. We are in accord with the conclusions reached and feel that color aerial photography is a field that has been relatively unexplored and that foresters will see more of it used in the future.

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Professional Status as Viewed by Some Graduate Students

The writer recently asked a group of 11 graduate forestry students at the University of Michigan the question: "Why doesn't forestry in the United States have greater recognition as a profession?" The students represented the United States, Canada, the United Kingdom, and the Philippines.

The answers were thoughtful and stimulating and I have undertaken to paraphrase them as perhaps of interest to readers of the JOURNAL.

We first agreed that a profession was an occupation based on a special body of knowledge; that it was more mental than manual; and that the "professor" was presumed to have at least some liberal education. Because forestry is "the scientific management of forests for the continuous production of goods and services," it obviously is, or should be, a profession. Foresters and most others schooled in the natural sciences would agree that it is. But would the general public agree, or would they even be conscious of the professional status of forestry one way or the other?

The public image of a forester seems to be something like this: a clean-living, rugged, outdoor type of individual who cuts trees, fights

fires, and plants baby trees. He is seldom regarded as a professional man in the same sense as a doctor or lawyer. Why is this? Here are some of the reasons that these young but mature-minded foresters gave.

One group of answers falls into a group concerned with our culture, social attitudes, and traditions. They go something like this: As foresters, we are not very often in the public eye, and when we are, our activities often take on a romantic tinge that creates misconceptions of what we really do. We are regarded as custodians of the forest, like fire guards and game wardens. Our profession is often identified with a trade or a skill without the tradition of authority it has in Europe.

The consensus was that part of this is our own fault, but much of it is caused by the public attitude toward our forest resource. In this country the use of a forest is regarded more as a right than privilege and many people are not particularly grateful for this right. There is little in our cultural heritage that compels recognition of our forests as a great and important national asset. Forests have always been here, they have always been plentiful, and trees do somehow grow by themselves without much help from men. My foreign students were emphatic that in Europe, and even Canada, the use of forests was regarded as a privilege and, consequently, foresters were held in considerably more esteem.

There are several other traditions and social attitudes (or facts) that hinder the full acceptance of professional forestry by the general public. In this country the traditional idea of a profession does not include forestry, although the dictionary definition does. Foresters have relatively little tradition of authority. Often we are salaried, not independent. What is worse, we are always being asked for professional advice simply as a favor; people expect the advice without pay. I can cite a personal example here to illustrate that point. Recently I spent a cold half-day with a friend of mine appraising a tract of timber. He said, "Thank you." This is how many people value the services of a forester. Did you ever ask your medical doctor, at a social gathering, about the pain in your chest?

The students also cited scientific and professional factors that tend to hinder recognition of forestry as a full-fledged profession. The following were emphasized: The real professional duties and problems of foresters are not generally known. Only the simplified technical and scientific matter is brought before the public and foresters themselves often seem to rely on rule-of-thumb forestry. To many people our practices do not seem to be based on scientific principles and, where this appears to be the case there is a corresponding lack of respect. Also, our very diverse subject matter makes it difficult to visualize a forester as a complete entity; that is, relate him to a single profession. The students also felt that our professional societies rarely take stands on important public issues and therefore do not get in the public eye.

It was also pointed out that the conditions of employment for some foresters are not favorable to professional recognition, and in fact, may actually color professional judgment. Some foresters are employed as technicians, custodians, or just workers. They may have little to say about company policy, not even the forestry policy. They may have little opportunity to assert or use their professional knowledge and may, in fact, be supervised (on forestry practices) by non-foresters. Furthermore, it is not uncommon for non-foresters to do forestry work in both private and public employment.

Perhaps the most severe indictment by the students was that many foresters do not keep professionally informed as well as do members of some other professions.

Some of the student's answers to our original question have an economic basis. Timber, a chief product of forest management, has a relatively low value per unit of product and per unit of land devoted to growing it. The economic necessity for foresters is obscure as compared to many other professions. The timber resource is considered to be plentiful and forests can, according to a prevalent view, take care of themselves (except for fire control and harvesting).

Logging activities are generally well known to the public but this is mostly an engineering activity. We are still exploring the remaining virgin and old-growth timber so that "growing the crop" has not had a prominent place in the public eye.

Some of the foreign students pointed out that the practice of forestry on both private and public lands in the United States has too often been linked to annual reports and annual budgets. By its very nature forestry is a long term business and foresters have not always been able to convince employers of this truth. Thus, they may be handicapped from the start in pursuing a full forestry program.

It is also a sad economic truth that foresters' financial returns are still well below the average for many other professions and this has its effect on social prestige and prominence. It seemed significant to me that these young foresters were aware of this, but still wanted to be foresters.

Some of the most telling answers to my question concerned the personal relations of foresters to other people. It was stressed that foresters do no render personal and repeated services to individuals, they generally have little direct contact with the great mass of urban people. Their work does not directly affect people's *lives*, as medicine and law does. Also, foresters in most states are not required to be registered or licensed in any way and there are no examinations required before they can practice. In some states even "tree surgeons" have called themselves foresters with impunity!

What is the remedy for all this?

That is another story, but the students had some suggestions for foresters. Let me paraphrase a few of these suggestions: "Keep our own identity — *be* foresters"; "*Earn* recognition from the public"; "Let professional integrity plus the increasing need for forest resources bring full recognition"; "Ask for a more important place in making the policies and planning the programs of forest business"; "Defend good forest practices"; "Maintain high ideals and standards"; "Expect payment for services rendered and advice given"; "Urge our professional societies to study and discuss pertinent public issues"; "Put the *profession* of forestry before the public eye at every opportunity."

All in all, I think these young foresters had something worthwhile to say about our profession.

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We Need a Standard Subject Matter Classification System for the JOURNAL OF FORESTRY

For the individual reader there are many issues of the JOURNAL OF FORESTRY that contain no information for immediate technical use. This is particularly true with the increased specialization in forestry. Through the years a great amount of usable information for all foresters has accumulated in the volumes of the JOURNAL. But for most field foresters this information becomes lost as the issues pile up and valuable information is buried. Although the December issue of the JOURNAL contains a listing of all articles by months, it is still up to the reader to ferret out an article dealing with a specific subject.

It is proposed that a subject matter library system be adopted by the Society and that all technical items appearing in the JOURNAL be classified for easy reference. Such a system, coupled with an easy-to-maintain card file, would increase the value of the JOURNAL many times. Forestry schools, research stations, and others maintaining library facilities have various subject matter-author filing systems. The Oxford system is one of the most comprehensive general systems available and it is used to classify technical material of world-wide interest in *Forestry Abstracts*. Several decimal schemes used in this country have been patterned after the Oxford system. But in order to approach an international system for forestry it would be well to use this system with no basic changes.

The Oxford system is based on subject matter and follows a decimal scheme. The whole number represents a major field in forestry such as: 1. Factors of Environment; 2. Silviculture; 3. Harvest, Engineering; etc. The major classifications are broken down to finer classifications, such as 2.2 Silvicultural Systems, and then 2.21 High Forest Systems, etc. Subject matter classifications may be broken down to a point where all material on a specific subject is filed under one heading. There are two good descriptions of the Oxford system[1] in the JOURNAL. We "stumbled" onto them while seeking other information.

The decimal system could be used to classify JOURNAL and *Forest Science* articles by subject matter. The proper file designation could be made by the author, reviewed by the editor, then included on the index page as part of the title of each technical article or note. The subscriber would use the assigned number and title to make a 3- by 5-inch card which would be filed under the proper number. To carry this idea further, bulletins, leaflets, papers, etc. can be classified and filed by this same system. In order for readers to use the system, an abbreviated scheme could be printed in the JOURNAL. Individuals interested in a more detailed system can buy a copy from the Commonwealth Forestry Bureau.

We see in this idea, or something like it, a way to use the deluge of valuable technical information that is being produced at an increased rate. Information would be available when it is needed, where it is needed—close to where the work is being done.

ROBERT D. WILLIAMS
F. BRYAN CLARK
Bedford, Indiana

[1] Flick, Frances. The Oxford system of decimal classification for forestry. Jour. Forestry 52:868-869. 1954.

———. Applying the Oxford system in America. Jour. Forestry 54:327-328. 1956.

Book Reviews

The Control of Lightning-Caused Forest Fires

By W. D. Bennett. 30 pp. Pulp and Paper Research Institute of Canada, Montreal. 1958. No price indicated.

In his booklet *The Control of Lightning-Caused Forest Fires*, W. D. Bennett surveys the problem created by recurrent lightning-caused fires in the forests of Canada and brings together in concise form all the available information on fire-setting lightning storms and the fires they generate. He develops the subject in the form of a problem analysis leading up to preliminary recommendations for research on this problem in Canada. He has succeeded very well in condensing the pertinent information from a large number of sources and has clearly related each part to the different phases of the problem. He includes a very complete bibliography which greatly enhances the value of this review and digest.

Most of the recent research on this subject has been through Project Skyfire, the lightning storm study project carried on by the Intermountain Forest and Range Experiment Station at Missoula, Montana as a part of the Forest Service's national program of forest fire research. Information developed through it provides an important part of the reference material. Complete investigation of the possibility of reducing the severity of lightning storms through cloud seeding techniques is an important part of the project. Conclusions are not yet possible but active research continues and it is reasonable to expect that the feasibility of easing the lightning fire problem in this way will be clarified a great deal in the next two years.

The author states that cloud seeding by balloon has been employed in Project Skyfire. No such technique has been used in the project. However, zero lift balloons have been used to test the potential convective movement of silver iodide smoke from ground generators. Probably such techniques led to this misinterpretation.

Two further statements by the author which cannot yet be supported by research are that a single lightning strike is not likely to start fire and that frontal storms create the chief lightning fire problem. As the author brings out, the amount of moisture present probably has the most important effect on the number of fires that persist and build up following lightning strikes. At any rate, barely detectable strikes from small localized clouds have been known to start fast spreading fires under drought conditions. In much of the Northwest the frontal type storm sets a great many more fires but is nearly always accompanied by enough rain to create conditions favorable for controlling them at small size. The air mass type of storm, which is much less extensive and which usually sets a smaller number of fires, has been responsible for a good many of the disastrous fires of the past in Montana and Idaho. For that reason the so-called dry lightning storm, which typifies the condition of cumulus build-ups from strong surface heating, is regarded as one of the principal targets of Project Skyfire.

Lightning and lightning fires have been controlling influences in unmanaged North American forests over the centuries. The natural tendency to regard lightning fires as an inevitable phenomenon about which nothing can be done is commented on by the author. The growing belief that something can be done to eliminate lightning as a major threat to future forest production, which Mr. Bennett evidently shares, is perhaps the most significant point of the book.

A. A. Brown
Division of Forest Fire Research, U. S. Forest Service

The Grafter's Handbook

By R. J. Garner. 2nd ed. 260 pp. Illus. Oxford University Press, New York. 1959. $5.75.

The recent increase in tree improvement work has stimulated interest in the grafting of forest trees. Grafting, however, has been used for centuries in horticultural practice. *The Grafter's Handbook* covers the subject very completely, from natural grafting and the use of grafting methods in Biblical times to the newest modifications such as the use of gibberellin and mist propagation.

This second edition of the handbook is printed in Great Britain. The author has been a leader in horticultural grafting at the well-known East Malling Research Station for many years.

Nine chapters cover the history of grafting, compatibility, rootstock propagation, treatment of scions, tools, a long chapter on methods of grafting, nursery practices, and orchard grafting. The book is illustrated with 149 line drawings and photographs. A bibliography of 143 references is of special interest to those doing this type of work. A complete glossary explains unfamiliar terms.

Garner's extensive chapter on methods of grafting is particularly outstanding. The methods and their

applications are clearly described and are illustrated with easy-to-follow line drawings. Most of the methods are described in terms of horticultural or fruit tree practice. However, some of the methods, for example the spliced side graft and the side cleft graft, are also applicable to forest tree grafting. Other methods described are undoubtedly adaptable for forest use.

The section on style grafting, herbaceous grafting, and methods used in disease transmission by virologists indicates the range of uses to which grafting may be put in both basic and applied fields, as well as the range of tissues which are compatible if properly and carefully manipulated.

From the description of his methods, it is obvious that Garner is a master craftsman at his art. His emphasis on the need for proper tools and precision work indicates his familiarity with the major factors for success of grafting. An up-to-date review of modern binding materials, grafting seals, and other supplies bring out further the need for care and thorough familiarity with the work.

Garner's new edition of the handbook is a concise and useful treatment of the subject by a respected authority in the field. While dealing more specifically with horticultural and orchard species, the theory and many of the techniques are applicable to forest trees. The book should receive wide circulation among interested foresters.

C. E. AHLGREN
Quetico-Superior Wilderness Research Center

Essentials of Forestry Practice

By Charles H. Stoddard. 253 pp. Illus. The Ronald Press Company, New York. 1959. $5.50

To the professional forester who spends a lot of time in an office, reading Stoddard's new book, *Essentials of Forestry Practice*, will be refreshing, not only for the practical way in which the application of forest management methods are discussed but also for the concise review it presents of many aspects of American forestry. This is no indication, however, that the book has been written for the forester already established in his profession. There are several other uses and needs to which it has been expertly tailored.

At present there is a recognized need for aides and technicians to assume a share of the daily administrative burdens of the professional forester. For this field of training in vocational and technical schools the book provides the material needed for a sound technical background in applied forestry. The Conservation Education Association has been interested in the availability of this practical textbook. The book is now being used as a text by some 40 students in the National School of Forestry and Conservation established by the author in association with Carl J. Holcomb and Stanley S. Locke. The 9-month sub-professional course in forestry, soil, water, fish, and wildlife conservation designed for off-duty, spare time study is built around *Essentials of Forestry Practice*.

The agricultural college student who wants a practical course in "farm forestry" will learn much from this text. It offers an excellent introductory course in general forestry for the student in professional forestry. Less sophisticated than the *Forestry Handbook*, to which it refers its readers for more specific details on management techniques and procedures, this book fills the need as a practical home textbook for forest owners, land managers, and field foresters. It can be used also for in-service training classes and as a reference source by small forest owners for record forms, management plans, and sample timber sale agreements.

The 12 chapters cover a range of subjects dealing with farsighted and efficient forest management. At no time does the author imply that he is trying to make a professional forester out of the land owner or the sub-professional aide or technician. The essential leadership of the professionally trained forester is not questioned. Chapter 1, "Opportunities in Forestry," will, however, stimulate the interest of many who read the book to look further into the experiences and challenges of a career in forestry or some phase of forestry work. The basic training which this book offers in general forestry methods will broaden the background and adaptability for other duties of the individual who has the desire and initiative to advance from the skilled labor group to the numerous sub-professional forestry jobs in both the public and private forestry organizations.

Chapter 5 covers "The Practice of Silviculture." Various types of intermediate cuttings, silvicultural systems used in harvest cuttings, the care, handling, and planting of forest tree seedlings, and the care of the young forest plantation are well handled. The major systems for subdividing lands in surveying, map making, acreage determinations, the various aspects of timber cruising are included in Chapter 6 along with composite volume tables and cumulative tally sheets. Continuous forestry inventory, "CFI," is mentioned.

Under the chapter on "Forest Management and Finance" there is a compartment operations record map which will show the forest manager or woodland owner how to use a simple sketch map to record forest management activities carried out on his land during the year. A simple system of keeping financial records is discussed so that the individual forest owner can make his forest business more successful by having some control over costs and income. It will also help at tax time.

Other products of the forest such as water, wildlife, forage, and recreation are covered in Chapter 11, with "Forests as Recreational Areas" discussed in considerable detail. In the last chapter there is a comprehensive chart which assembles all the forestry programs that now provide assistance to private owners.

The appendix contains helpful material on forest terminology, timber species, management plans, and forestry organizations. Sam-

ple timber sale and operating agreement forms and contracts make the book useful to the owner who has a few to several hundred acres of woodland.

The illustrations, charts, and tables in the book are well selected and complement the text. In total, Stoddard's *Essentials of Forestry Practice* is a book that fills the need for a practical textbook on the subject.

MILTON M. BRYAN
U. S. Forest Service

Publications of Interest

The Vital Role of Radio in the Forest Industry is a 24-page pamphlet published by Forest Industries Radio Communications, a committee formed to aid forest industries in effectively employing radio communications. A pictorial presentation of the role of radio in the forest industries, the pamphlet shows how industrial radio is used for the protection of life and property while it at the same time points out industry's aims and its role in forest management. Obtainable from Forest Industries Radio Communications, 10 East 18th Ave., Eugene, Ore.

* * *

A *Handbook of Log Rules*, featuring tables of board foot volume measure as well as other statistics of daily useage to personnel in the forest industries and related fields, has been published by International Harvester Co.

Available at no cost, the 32-page illustrated handbook provides an aggregate of log rules most commonly used from coast to coast. Included are other guides for computing plot radii, the number of transplants per acre for various spacing, and average weight of logs and lumber in pounds per 1,000 feet.

The pocket-size handbook, CR-626-I, can be obtained from any International equipment distributor or by writing to International Harvester Co., Consumer Relations Department, 180 North Michigan Ave., Chicago 1, Ill.

* * *

The Crown Zellerbach Corp., Portland 4, Ore., has recently issued a 12-page booklet entitled *Edward P. Stamm Tree Farm*. It is a history of the corporation's management of an 80,000-acre area of cutover timber purchased 30 years ago in northwest Oregon.

* * *

Richard L. Weaver, associate professor of conservation and conservation education, School of Natural Resources, University of Michigan, has recently completed and the University has published a study of *The Nature and Extent of Leadership in Conservation Education in State Agencies 1956-1958*. All state-level education and resource agencies in the various states were reviewed by questionnaire and personal visits. Types of programs, agencies involved, summaries of programs by states, and other pertinent subjects are covered. No cost is indicated.

* * *

In 1957 the Utah Legislature directed the State Park and Recreation Commission to formulate and put into executions a long range comprehensive plan for a state park and recreation system. A survey has been made and recommendations developed. They are reported upon in *Report of Utah State Park and Recreation Commission—1959*, transmitted to the Governor by Commission Director Chester J. Olsen. The report asks for acquisition by the state of 1,646,174 acres of lands now administered by the Bureau of Land Management, among other acreages, pointing out that BLM had no recreation program and certain important scenic values in the state have been damaged by vandalism and other causes, resulting in damage to the state's recreation and park potential.

* * *

A most satisfying explanation of why, on certain soils, seedlings heave-out and transplants do not is given by J. R. Schramm in "The Mechanism of Frost Heaving of Tree Seedlings," published in Proceedings of the American Philosophical Society, v. 102(4): 333-350. 1958.

* * *

Insects, often the bane of a forester's existence, seriously curtail the efficiency of woods labor. The pulp and paper industry of Canada is acutely aware of insect problems, particularly those created by mosquitoes, black flies, midges (no-see-ums), deer and other flies. Because of this interest a booklet *The Biting Fly Control Manual* by Professor A. S. West of Queen's University, has been prepared. The problem is defined and recommendations made for doing something about it. Organization of control programs and costs are discussed. This 142-page processed manual, the result of a cooperative project between industry and government, was published in 1958 by the Pulp and Paper Institute of Canada, Montreal, as Woodlands Research Index 104. No price indicated.

* * *

The first publication specifically covering employment in the fisheries field is *Fisheries as a Profession*, now available from the American Fisheries Society, P. O. Box 429, McLean, Va. No charge is made for 10 or less copies.

The illustrated brochure touches on the importance of fisheries, personnel and employment, education, salaries and benefits, sources of employment, and suggestions for obtaining detailed information on the fisheries field.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University College of Forestry at Syracuse University*
Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

General

Forestry in Sweden. By Thorsten Streyffert. 55 pp. Illus. Oregon State College, Corvallis. 1958.

The Living Forest. By Jack McCormick. Illus. Harper & Bros., New York. 1959. $3.95.

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Production of Poplar Timber in Europe and Its Significance and Application in the United States. By E. J. Schreiner. 124 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1959. Agric. Handbook No. 150. 45 cents. (Govt. Print. Off.)

Farm Forestry

The Economic Value of Seventeen Western Washington Farm Forests. By M. M. Mosher. 27 pp. Washington Agric. Expt. Sta., Pullman. 1958. Bul. No. 596.

Piedmont Farm Woodlands. By D. F. Olson, Jr. and H. J. Doyle. 18 pp. Illus. Furniture, Plywood, and Veneer Council of the North Carolina Forestry Ass'n., Inc., Statesville. 1959. Rept. No. 5.

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Forest Genetics

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A Management Guide for Northern Hardwoods in New England. By A. M. Gilbert and V. S. Jensen. 22 pp. Illus. Northeastern Forest Expt. Sta., Upper Darby, Pa. 1958. Sta. Paper No. 112.

Understory Plants of Bottomland Forests. By L. C. Maisenhelder. 40 pp. Illus. Southern Forest Expt. Sta., New Orleans, La. 1958. Occasional Paper No. 165.

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The Forest Resource of Central Minnesota. 48 pp. Illus. Office of Iron Range Resources & Rehabilitation, St. Paul 1, Minn. 1958.

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Canker-Rots in Southern Hardwoods. By E. R. Toole. 4 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1959. Forest Pest Leaflet No. 33. 5 cents. (Govt. Print. Off.)

Maple Tree Problems. By H. C. Miller and S. B. Silverborg. 18 pp. Illus. State Univ. College of Forestry, Syracuse, N. Y. 1959. Tree Pest Info. Serv. Leaflet No. 12.

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Insect Enemies of Southern Pines. By W. H. Bennett, C. W. Chellman, and W. R. Holt. 35 pp. Illus. Southern Forest Expt. Sta., New Orleans, La. 1958. Occasional Paper No. 164.

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The Orange-Striped Oakworm. By S. W. Hitchcock. 8 pp. Illus. Connecticut Agric. Expt. Sta., New Haven. 1958. Cir. No. 204.

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Livestock-Poisoning Weeds of Oregon. By H. M. Gilkey. 74 pp. Illus. Oregon Agric. Expt. Sta., Corvallis. 1958. Sta. Bul. No. 564.

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Prairie, Dogs, Whitefaces, and Blue Grama. By C. B. Koford. 78 pp. Illus. 1958. Wildlife Monog. No. 3. Dr. J. P. Linduska, Exec. Sec. of the Wildlife Society, % Remington Farms, Chestertown, Md. 75 cents.

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Society Affairs

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Report of Council Meeting

A meeting of the Council of the Society of American Foresters was held April 6 and 7 at the Palmetto Bluff Lodge of Union Bag-Camp Paper Corporation, near Savannah, Georgia.

Present were President G. A. Garratt, Vice President H. J. Malsberger, and eight Council members, B. E. Allen, P. A. Briegleb, D. E. Clark, C. A. Connaughton, K. P. Davis, W. D. Hagenstein, J. H. Stone, and H. J. Vaux; together with Henry Clepper, executive secretary. M. K. Goddard was unavoidably absent because of illness.

Scheduled Annual Meetings

Annual meetings have been definitely scheduled as follows:

1959—San Francisco, California. November 15-18. Sheraton Park Hotel.

1960—Washington, D. C. November 13-16. (Sixtieth anniversary meeting.) Sheraton Park Hotel.

1961—Minneapolis, Minnesota. October 8-11. (Joint meeting with the Canadian Institute of Forestry.) Leamington Hotel.

1962—Atlanta, Georgia. October 21-24. Dinkler Plaza Hotel.

1963 Annual Meeting

The 1963 annual meeting, under the Society's rotation system, is scheduled to be held in the Northeastern region. Invitations were received from the Allegheny Section to hold the meeting in Philadelphia and from the New England Section to hold it in Boston.

Because the Society's 60th anniversary meeting is scheduled for Washington, D. C. in 1960, and because Washington is easily accessible to members of the Allegheny Section, the Council had previously (September 29, 1958) voted unanimously to hold the 1963 meeting in Boston.

On a motion by Mr. Allen, seconded by Mr. Hagenstein, the Council voted unanimously to reaffirm its previous action to hold the 1963 meeting in Boston; and, in addition, to recommend to the Council that will be in office, when under the rotation system a national meeting would next be held in the Northeastern region, that Philadelphia be considered as the preferred city.

1964 Annual Meeting

An invitation to hold the 1964 annual meeting in Spokane, Washington, had been received from the Inland Empire Section.

A second invitation to hold this meeting either in Rapid City, South Dakota, or in Denver, Colorado, had been received from the Central Rocky Mountain Section.

In discussing these invitations, the Council took into consideration the fact that the 1953 annual meeting was held in Colorado Springs, in the Central Rocky Mountain Section. No national meeting of the Society has ever been held in the Inland Empire Section.

Accordingly, on a motion by Mr. Hagenstein, seconded by Mr. Stone, the executive secretary was authorized to explore the possibilities of holding the 1964 annual meeting in Spokane.

Proposal for 1966 Meeting

An invitation has been received from the Wisconsin-Michigan Section to hold the 1966 annual meeting in a

THE COUNCIL of the Society of American Foresters met April 6-7 at the Palmetto Bluff Lodge of Union Bag-Camp Paper Corporation, near Savannah, Ga. In attendance, shown left to right, were: President George A. Garratt, Vice President Henry J. Malsberger, B. E. Allen, Philip A. Briegleb, Donald E. Clark, Charles A. Connaughton, Kenneth P. Davis, William D. Hagenstein, J. Herbert Stone, Henry J. Vaux, and Executive Secretary Henry Clepper. Council member Maurice K. Goddard was unable to attend because of illness.

Michigan city, the dates and place to be determined later. The latest national meeting in the Section territory was held in Milwaukee in 1954.

On motion by Mr. Clark, seconded by Mr. Hagenstein, the Council voted unanimously not to decide on specific places and dates for annual meetings further than five years in advance.

This action is not intended to invalidate the Council's long standing custom of scheduling annual meetings in Washington, D. C. every ten years; as for example, the 40th anniversary meeting held in 1940; the 50th anniversary meeting held in 1950; and the 60th anniversary meeting scheduled for 1960.

Conference of the Council and Section Delegates

A joint conference of the Council and Section delegates will be held Sunday evening, November 15, at the Sheraton Palace Hotel in San Francisco. The purpose of the conference is to discuss topics that are believed to be of sufficient importance as to make closer liaison betwen the Council and the Sections.

Among these topics that might be discussed are the following:

1. The successful operation of a Section policy and legislative committee.
2. Development of Section programs for the recruitment of qualified students for the forestry schools.
3. Section—Chapter relationships.

Society Affairs Session

The regular Society Affairs session of the annual meeting will be held on Monday afternoon, November 16, 1959 at San Francisco.

As part of the program of this session, the Council will schedule a panel discussion on the policy topic: state registration and licensure of foresters.

Subject Divisions

Because of an apparent need for clarification of the functions of the nine subject Divisions, and for guidance of their officers in connection with the administration of Division committees, activities, and meetings, the executive secretary was directed to prepare an article for the JOURNAL OF FORESTRY.

Provisions for subject Divisions are contained in Article XII of the Constitution and in Bylaws 80, 81, 82, and 83.

The subject Divisions are as follows: Economics and Policy, Education, Forest Management, Forest Products, Forest Recreation, Forest-Wildlife Management, Range Management, Silviculture, and Watershed Management.

The Council notes that many members attending Division meetings have complained that the programs are frequently characterized by too many and too long papers.

On motion by Dr. Vaux, seconded by Mr. Hagenstein, the Council voted to direct the attention of all Division officers to this problem and to urge that all sessions be so programmed that they can terminate at the allotted hour with time available for discussion.

Presentation of Awards

Periodically, the Society makes three principal awards. In the past, the Sir William Schlich memorial medal and the Gifford Pinchot medal have been awarded every two years, but not necessarily both in the same year. The award for achievement in biological research was awarded first in 1956; and it has been awarded annually since that year.

The three awards have been made as follows:

Sir William Schlich Memorial medal.

1935—Franklin D. Roosevelt.
1940—Gifford Pinchot.
1944—Henry S. Graves.
1946—William B. Greeley.
1948—H. H. Chapman.
1950—Ralph S. Hosmer.
1952—Ellwood Wilson (posthumously).
1954—Tom Gill.
1956—Samuel T. Dana.
1958—B. Frank Heintzleman.

Gifford Pinchot medal.

1950—Henry S. Graves.
1952—Rapael Zon.
1954—William L. Hall.
1956—Inman F. Eldredge.
1957—Henry Clepper.

Award for Achievement in Biological Research.

1956—Leo A. Isaac and Philip C. Wakeley.
1957—Harold J. Lutz and Carl S. Larsen.
1958—Nicholas T. Mirov.

On motion by Mr. Hagenstein, seconded by Mr. Stone, the Council voted unanimously not to make awards of the Schlich and Pinchot medals at the 1959 meeting, but to reserve them for 1960, because of the historical importance of the 60th anniversary meeting.

The Committee on the Award for Achievement in Biological Research (P. A. Briegleb, chairman) proposed that the award, consisting of an engraved plaque and a cash honorarium,

be made to a designated recipient in 1959.

On motion by Mr. Hagenstein, seconded by Mr. Connaughton, the Committee's nomination was unanimously approved. As is customary, the name of the recipient will not be revealed until the presentation which will be at the Society's annual dinner on November 18 in San Francisco.

Proceedings versus Abstracts

At the Council meeting held September 28, 1958, discussion revolved around the question of whether to substitute a short publication, titled *Abstracts*, of papers presented at an annual meeting rather than the customary *Proceedings* which includes all papers together with related discussion and reports.

An outline of the problem was published as part of the report of the Council meeting. (See the JOURNAL OF FORESTRY for December 1958, pages 921-922.)

The principal alternatives are:

1. Publish only a proceedings consisting of abstracts of papers.
2. Publish abstracts, but with selected papers also appearing in full in the Journal.
3. Publish a proceedings in which only a portion of the papers appear in full with the remainder abstracted.
4. Publish selected papers as JOURNAL articles and have no proceedings.

Pros and cons of various possibilities were discussed. No conclusion was reached, and the editorial staff was instructed to study the matter further.

In the course of further study only one consideration not previously presented was uncovered; a few speakers at the Salt Lake City meeting expressed a strong wish that their papers be published in the JOURNAL rather than the proceedings. Considering the smaller distribution of proceedings, doubtless others would agree.

However, in the study the staff was able to formulate its own recommendation. It is that the present policy be continued for the time being. Reasons are as follows:

1. There is considerable justification for a full proceedings of an event as important as an annual meeting.
2. We are presumably committed to full proceedings in 1959. The 1960 meeting is a major event and should certainly be reported in full in as attractive manner as possible.
3. The Puget Sound Section has expressed an interest in, though it is not yet committed to, indexing all proceedings. Proceedings have not, for various reasons, been indexed with the Journal.

Table 1.—Income, Expense, Budget (1958-1959)

	1958 *Actual*	1959 *Budget*
Income		
Dues	$113,716	$119,000
Fees	1,131	1,200
Subscriptions and Sales	10,008	10,000
Advertising	38,720	43,000
Miscellaneous income	2,807	3,000
Forestry Terminology	1,140	750
Miscellaneous Society publications	920	900
Forestry Handbook	3,356	2,500
Interest and Dividends	2,502	2,800
Forest Science	1,968	1,000
Total	$176,268	$184,150
Expense		
JOURNAL OF FORESTRY	$ 49,634	$ 52,600
Editors' expense	986	1,200
Salaries, editorial	17,008	18,900
Salary, Executive Secretary	11,717	12,000
Salaries office	36,664	41,700
Advertising commission	10,904	9,850
Advertising promotion and expense	4,474	4,500
Travel, officers	4,202	4,500
Postage	2,454	3,000
Telephone and telegraph	821	900
Rent	7,308	7,308
Multigraphing and mimeographing	387	700
Miscellaneous printing	1,274	1,400
Office supplies	1,313	1,500
General expenses	1,358	1,500
Depreciation	1,635	1,750
Retirement plan	1,522	2,275
Dues paid to affiliated organizations	210	360
Committee expense	93	100
Division expense	22	100
Grading schools	349	600
Council travel	942	1,200
Social Security tax	1,215	1,540
Election of officers and Fellows	—	850
Maintenance of equipment	512	550
Referenda	—	—
Proceedings	904	1,000
Miscellaneous	16	500
Total	$157,924	$172,383
Net earnings	18,344	11,767

In view of the foregoing considerations, on motion by Mr. Briegleb, seconded by Mr. Stone, the Council voted unanimously to continue to publish *Proceedings* of the 1959 and 1960 annual meetings.

SAF Budget

Table 1 shows SAF income and expense during the fiscal year 1958 (December 1, 1957—November 30, 1958), and the proposed budget for the fiscal year 1959.

The budget for 1959 was approved without objection.

Advertising Rates

The base advertising rate for a single page of the JOURNAL OF FORESTRY is $200.

In view of rising publishing costs, a substantial increase in circulation, and the prestige that the JOURNAL has gained, the Council was asked to consider a 25 percent increase in advertising rates as of January 1960. This proposed increase would become effective provided the general rise in business continues and other economic factors remain favorable.

The proposed increase in advertising rates was approved by the Council, without objection.

Increased Subscription Rate for Journal of Forestry

The annual subscription rate for the JOURNAL OF FORESTRY is $7.50. Canadian postage is 50 cents additional, and other foreign postage $1 additional.

In keeping with the reasons for increasing advertising rates for the JOURNAL, the Council was asked to authorize an increase in the subscription rate to $9 effective January 1960. Single copies would be priced at $1. Canadian and foreign postage would continue to be extra, but would remain the same as at present.

On motion by Mr. Clark, seconded by Mr. Malsberger, the proposed increase in the JOURNAL subscription rate to $9 was unanimously aproved.

Members are reminded that the increased subscription rate applies only to nonmember subscribers. It will involve no increase in members' dues.

Forest Science

Stephen H. Spurr, editor of *Forest Science*, submitted the following report as of April 1, 1959:

I find that we have 22 articles accepted and awaiting publication, while I have another 22 manuscripts, several of which are nearly ready for publication. Since we have been publishing an average of 40 manuscripts a year, this amounts to about a year's backlog. Should the Council increase the subscription to *Forest Science* to $7.50 rather than $6, and plan on running 112-page issues beginning as soon as finances permit?

As a further note, the flow of manuscripts to my office has increased markedly. I received 21 manuscripts in the last quarter of 1958, as compared with 15 each in the last quarter of the two previous years. During the first quarter of 1959 I received 23 manuscripts, which also seems to indicate a general upward swing in the submission rate. I suspect that, with *Forest Science* now accepted, and with the probability of one or two Monographs being included free a year, there would be no major buyer's resistance to a $7.50 subscription price.

In view of the Council's action in voting to authorize an increase in the subscription of the JOURNAL OF FORESTRY, and in view of the fact that *Forest Science* must in any case be subsidized from SAF income, the Council took no action on the proposed increase in the subscription rate of *Forest Science*.

Membership Directory

The latest *Directory of Members* was published as a supplement to the JOURNAL OF FORESTRY in 1956. It is now out of date.

As part of the observance of the Society's 60th anniversary in 1960, a new *Directory of Members* would be appropriate. The 1956 *Directory* cost approximately $6,500 to compile, publish, and distribute. Because of higher printing costs and postage rates, a new Directory, distributed as was the 1956 edition, might cost at least 20 percent more.

Accordingly, on motion by Mr. Stone, seconded by Mr. Biegleb, the Council unanimously authorized the publication in 1960 of a *Directory of Members* on a self-liquidating basis. In effect, this means that members wishing a copy of the *Directory* will be asked to pay the actual cost of producing it.

The Council further instructed that the *Directory* would be made available to members only, and would be prohibited for use for commercial or political purposes.

Forestry in the Soil Conservation Service

In 1956 the Allegheny and the Appalachian Sections submitted resolutions to the Council requesting action with respect to employees of the Soil Conservation Service, who have no professional education in forestry, making forest management plans and recommending silvicultural practices to private woodland owners.

After consideration of the resolutions, the Council took the following action:

"By motion of Mr. Stone, seconded by Mr. Coulter, the Council unanimously directed the President to transmit copies of the two Section resolutions to the administrator of the Soil Conservation Service, and to express the strong position of the Society against nonprofessional workers of public agencies carrying on silvicultural practices and similar forestry work."

Members wishing to review the background of this matter are invited to refer to the statement "Forestry in Soil Conservation Service" on pages 281-282 of the JOURNAL OF FORESTRY for April 1956. See also "Exchange of Letters between SAF and SCS" in the JOURNAL for June 1956, pages 414-417.

On motion by Mr. Allen, seconded by Dr. Davis, the Council voted unanimously to reaffirm the action previously taken by the Council in February 1956. In addition, President Garratt was authorized to state the Council's attitude in a letter to the Secretary of Agriculture.

World Directory of Schools of Forestry

In 1953 the Food and Agriculture Organization of the United Nations published a *Directory of Forestry Schools* that listed most of the institutions throughout the world then offering programs of instruction in higher forestry education.

Following publication of the book, FAO began gathering data for a new edition which would be more comprehensive and up to date. Regrettably, because of higher priority of other projects, it was unlikely that FAO could publish a new edition before or during 1960.

Because of the important role to be assigned forestry education at the Fifth World Forestry Congress which will be held in Seattle, Washington, during late August and early September 1960, a complete reference book on schools of forestry of college and university level would contribute to further discussion of the theme.

Moreover, recent information on world schools of forestry could be of value to our American schools when persons from foreign nations apply for graduate instruction or for scholarships.

Inasmuch as FAO will be unable to publish the second edition of the *Directory*, the Council was asked to consider the possibility of its publication by the Society. The FAO Division of Forestry and Forest Products has offered to supply the Society with a typescript of the data, now in process of being assembled from its member governments.

It was further agreed by FAO that the Society would copyright the book. The Society would offer it for sale at a cost which would amortize the Society's expenses.

Had FAO been able to publish the book it would have been a trilingual edition, using the FAO official languages (English, French, and Spanish) with data given for a particular school in the language best known in the country concerned. An edition published by the Society would be in English throughout.

In view of the foregoing considerations, on motion by Mr. Clark, seconded by Mr. Briegleb, the Council voted unanimously to publish the *World Directory of Forestry Schools* as compiled by FAO.

Study of Education

Henry J. Vaux is chairman of the steering committee for the Study of Education in Forestry and Related Fields of Natural Resources Management. For background on this study members are invited to refer to the JOURNAL OF FORESTRY for June 1958, page 439; December 1958, pages 927-928; and May 1959, page 385.

Dr. Vaux reported that Samuel T. Dana has been appointed director of the study, succeeding Harold G. Wilm, who resigned on becoming commissioner of the New York Department of Conservation.

Because of the change in the directorship and other aspects of the administration of the study, the original grant of $39,500 from the Old Dominion Foundation may not be suffi-

cient to finance it through to completion.

Provided funds are not forthcoming from other sources, on motion by Mr. Stone, seconded by Mr. Hagenstein, the Council voted unanimously to underwrite the completion of the study up to $12,000, if necessary.

Professional Income of Foresters

In 1959 there was published a brochure *Professional Income of Engineers—1958*, compiled by the Engineering Manpower Commission of the Engineers Joint Council. A similar type of survey has been proposed as a project by the Society of American Foresters.

On motion by Mr. Briegleb, seconded by Mr. Allen, the Council authorized the appointment of a committee to explore the professional income of foresters, and to make a recommendation to the Council as to the plans for such a study at the Council's meeting on November 15, 1959.

Biographical Sketches of Candidates for the Council

SAF Bylaw 42 provides that a brief and strictly factual professional biography of each candidate for president shall be published preceding the binnial election.

As regards information on candidates for the Council, the bylaw provides merely that the names of the candidates shall be listed in alphabetical order and shall show their addresses and Section affiliations.

Several voting members have proposed that the voters should have more information on the professional records of the Council candidates, including their activities in Society affairs, than has been required by the bylaw. Taking note of the reasonableness of this proposal, the Council authorized a committee consisting of Dr. Davis, chairman, and Mr. Hagenstein and Mr. Briegleb, to develop standards for presenting biographical data in connection with the ballots.

Accordingly, on motion by Mr. Briegleb, seconded by Mr. Hagenstein, the Council unanimously approved the following standards for presenting information on candidates for the Council.

"1. The data shall accompany, but not be incorporated on, the ballot.

"2. The average length of each biographical sketch shall be 100 words, with 150 words as the individual maximum.

"3. The content is to be stricly factual and designed to give basic information, with dates of major career assignments, organization offices held, and contributions. It shall include significant activities in Society affairs, such as offices held, important committee service, and similar activities. Records of professional education, degrees received and dates, shall be included. It shall not include presonal or family data or records of membership in fraternities or other organizations not bearing on the candidate's professional career.

"4. This information is to be requested from candidates by the executive secretary who shall then edit the material in consistent and uniform style. When possible, each biographical sketch shall be reviewed by the candidate for errors or omissions."

A Resolution on Election of Council Members and Fellows

The following resolution was adopted by the Kentucky-Tennessee Section on January 31, 1959 and sent to the Council.

"We, the Members of the Kentucky-Tennessee Section of the Society of American Foresters, are irate over present systems and believe that better and more satisfactory definitions, arrangements, and procedures can and should be developed for election of both Council Members and Fellows. To this end, and despite the 1957 changes in procedure for election of Fellows, we request that the Council appoint new committees to thoroughly re-examine both questions. We think that each of the 21 Sections should be represented on these committees.

"More specifically, we believe:

"1. So long as there are Sections that the principle of sectional representation should apply in election of Council Members. (We recognize that a relatively small Section such as ours, with approximately 200 members, is not entitled to the same representation as, for example, the Southeastern with over 1,000 members. We insist, however, that this problem can be dealt with either by grouping the Sections or by enlarging the council.)

"2. That (*a*) there needs to be a redefinition of qualifications for the grade of Fellow; (*b*) the number of Fellows should be at least 5 percent and perhaps 10 percent of the total Society membership; (*c*) Fellows should be nominated and elected regionally.

"The Secretary is directed to send copies of this resolution to the President, Vice-President, each of the nine Council members, and to the Secretary of each of the other 20 Sections of the Society."

In its consideration of this resolution the Council noted that the Kentucky-Tennessee Section was organized in 1942. Since that year, eight biennial elections to the Council have been held. During three of the elections no Council candidate from the Section was nominated. During the five elections in which Council candidates from the Section were nominated, one was elected and three failed of election.

During the eight biennial elections for Fellows, there were six elections in which no Member resident in the Kentucky Section was nominated. In two of the elections resident Members of the Section were nominated for Fellows but were not elected.

Council members represent the entire Society, not individual Sections. In fact, few if any matters ever come before the Council that involve consideration from a narrow Sectional viewpoint in contrast to the Society at large.

Fellows, as defined by the Constitution (Article III, Sec. 7) "shall be foresters recognized generally throughout the profession as persons who have rendered outstanding service to forestry and the Society." Thus, a basic requirement for the grade of Fellow is that he shall be known widely; certainly, outside the confines of one Section. Finally, it is pointed out that there is no numerical limitation on either the number of Fellows who may be nominated or the number who may be elected.

On motion by Mr. Connaughton, seconded by Mr. Hagenstein, the Council voted unanimously to continue the present system of electing Council members and Fellows.

Another item having to do with elections was taken under advisement by the Council. This involved a request from members for information on the number of votes received by nominees for the Council and Fellows.

It has been a long standing procedure for the tellers who count the ballots at an election to certify as to those elected, but to withhold information as to the number of votes received by successful candidates and by those who fail of election. This practice has been followed in order to avoid possible embarrassment to those who are not elected.

On motion by Mr. Hagenstein, seconded by Mr. Malsberger, the Council voted unanimously to reaffirm the policy of previous Councils in maintaining the secrecy of elections.

Natural Resources Council

Organized in 1946, the Natural Resources Council of America is a body made up of forty national and regional organizations that are working in the field of conservation and management of renewable natural resources, including soil and water.

The role of the Council is that of a service agency to its member organizations, whose policies or actions it does not undertake to control. Its principal functions are to effect closer cooperation between member organizations in the attainment of common objectives, and to make available to the member organizations information pertinent to conservation matters, including information on actions of the Congress and federal and state administrative agencies.

The Society of American Foresters became a member of the Natural Resources Council in 1947.

The Natural Resources Council went on record in 1958 as being willing to sponsor and support a Western Hemispheric conference on natural resources. This conference was first proposed for 1958, but since it was impracticable to hold it either in 1958 or 1959, the year 1960 was agreed to.

The Fifth World Forestry Congress has been scheduled for the period August 29-September 10, 1960. It will feature multiple-use land and water management, including forests, range, wildlife, watersheds, recreation, and related subjects.

Consequently, a Western Hemisphere conference on natural resources in 1960 would directly and inevitably conflict with the World Forestry Congress. Thus, two international conferences held in America in the same year would each reduce the effectiveness of the other, both as regards attendance and general interest.

Finally, it should be mentioned that the Fifth World Forestry Congress is being organized under the sponsorship of the U. S. State Department's Office of International Conferences.

In October 1958 Executive Secretary Henry Clepper, who is the representative of the Society of American Foresters to the Natural Resources Council, protested to the NRC against its action in agreeing to sponsor and support the proposed Western Hemispheric conference in 1960.

On motion by Dr. Davis, seconded by Dr. Vaux, the Council voted the following resolution (Mr. Hagenstein abstained on the grounds that the Society should withdraw its membership in the NRC):

"The Council of the Society of American Foresters supports fully the protest of the executive secretary against the action of the Natural Resources Council of America in approving sponsorship of a Western Hemispheric Conference on Natural Resources in 1960. This endorsement by NRC encourages activity in direct conflict with the Fifth World Forestry Congress previously scheduled for Seattle, Washington during August 29-September 10, 1960, and appears to involve the Natural Resources Council in action beyond the scope of its expressed objectives. In continuing its affiliation with the Natural Resources Council the Society of American Foresters does so in the expectation that the Council's future activities will be consistent with its stated objectives."

Affiliate Membership

By resolution of the Allegheny Section, the Council has been requestd to review the qualifications for Affiliate Membership, classes A and B.

On a motion by Mr. Stone, seconded by Mr. Connaughton, the Council authorized a study of the Affiliate Member grade, to be undertaken by the Council Committee on Membership (Dr. Vaux, chairman; Mr. Allen and Mr. Hagenstein). The committee was requested to report to the Council at its meeting on November 13, 1959.

Elections to Membership

By majority vote, the Council elected the following two applicants to Affiliate Membership:

Robert William Parnell, 107 South Pine Street, Summerville, S. C.

William Charles Bartholomew, 2329 Moundview Dr., Topeka, Kan.

In Appreciation

In gratitude for the excellent facilities at Palmetto Bluff Lodge and for the gracious hospitality of the Union Bag-Camp Paper Corporation, the Council by rising vote thanked J. R. Lientz, vice president and resident manager.

Thanks also were extended to B. E. Allen, fellow Council member, and to I. E. Pierce, steward of the lodge.

The meeting adjourned at 9 p.m., April 7.

Council's Column

The Society and The Fifth World Forestry Congress

The Society of American Foresters is one of the supporting sponsors of the Fifth World Forestry Congress to be held at the University of Washington in September 1960. For us as foresters and as citizens of the host nation the congress can carry with it considerable opportunity and a large responsibility.

American forestry has the chance to come of age in the eyes of the world through this international conference and things attendant to it. Most of us will be unable personally to look in on the proceedings; facilities alone would not permit. Many of us will be able to assist in one way or another in the preparations for it or for related activities. A number will be able to help with organized tours for our guests to observe America and to observe American forestry in various parts of the United States.

Regardless of personal participation in such events, in the atmosphere of the congress and the preparations for it each of us can avail ourselves of the opportunity to become a part of it. This participation can be furthered especially through our Society affairs. Members who know what is going on in world forestry would do well during the next 12 months to inform the rest of us through articles in the JOURNAL OF FORESTRY. In its March meeting this year the Washington Section took the lead with a panel on "The Role of American Foresters in World Forestry." Through similar Section and Chapter discussions and otherwise during the coming year, would it not be well for us to inform ourselves and one another better as a basis for learning and determining our place as foresters on the world scene? Our Fellow Member Tom Gill at our Salt Lake City meeting last fall helped to set the stage.

At a recent meeting of the International Press Institute attended by editors and journalists from all over the world, an eminent American scientist, in discussing international

tensions and the goals of mankind for disarmament and for freedom, spoke to "the greater development of something which pervades the whole of natural science, and most of learning, and which is beginning even to touch our colleagues behind the Iron Curtain." As quoted in *Harper's Magazine* he referred to "the fraternal communities of men embarked on specialized work: those who know how to extirpate malaria; those who seek to understand the radio signals coming to us from remote parts of the Universe; those who recreate the early history of man, his art, and his learning. Their knowledge and knowhow bind them together as possessors of true community (of interest), complementary to the local geographic communities, complementary to the communities of state and civic tradition; they are the warp of community, as the nations are the woof. These communities of the mind are the human counterpart and the basis of the international institutions that the future must hold in store and on them rests, it seems to me, the hope that we will survive this unprecedented period in the history of man."

In the Fifth World Forestry Congress, through our profession and our Society, and through learning and dissemination of knowledge, I am sure that we have a considerable opportunity as American citizens to rise to the greatest challenge that is facing all of mankind.

DONALD C. CLARK

Fifth Call for Council Nominations

All members are hereby notified that the regular biennial election will be held December 5, 1959. A president, vice president, and nine other members of the Council will be elected for the two-year term 1960-1961.

The present Council is listed on page 449. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for more than two decades.

Table 1, page 136 February issue, shows distribution of Council members by states 1944-1959.

Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president. Thus all candidates for president are considered as nominated also for vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under which nominations are made by petition.

1. Each petition shall name but one candidate.

2. All candidates must be eligible to hold elective office.

3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)

4. A voting member may not sign more than one nominating petition for president or more than one nominating petition for a member of the Council. That is, he may sign two, but no more.

5. Petitions must be in the Society office by September 19, 1959.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow) for the office of president (or member of the Council) for the two-year term 1960-1961.

No nomination will be considered valid unless supported by the nominee's acceptance in writing.

The form of acceptance of a nomination may read as follows:

"I accept the nomination to the office of President (or to membership on the Council) of the Society of American Foresters for the two-year term 1960-1961, and agree to serve if elected."

All nominating petitions should be sent promptly to the Society office, 425 Mills Building, Washington 6, D. C. The executive secretary will gladly provide information about nominating or election procedure.

According to the Constitution (Article VIII, Section 1) a Nominating Committee has been appointed by President Garratt. The Committee is composed of the following members:

Chairman, Harry Wm. Dengler, Extension Service, University of Maryland, College Park, Md.

Earl J. Adams, 4705 Tenth Avenue South, Minneapolis 7, Minn. (State Division of Forestry.)

Robert R. Milodragovich, U. S. Forest Service, Cody, Wyo.

Harry M. Roller, Jr., Woodlands Department, International Paper Company, Mobile 9, Ala.

George Stenzel, College of Forestry, University of Washington, Seattle 5, Wash.

This committee is charged with the following duties:

1. To set the date of the election. (December 5, 1959, is the date.)

2. To provide for at least two candidates for the office of president, and at least nine candidates for membership on the Council.

3. To receive separate nominating petitions for the office of president and for each member of the Council, and to supplement such petitions when necessary with other nominations in order to comply with item 2 above.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations.

Nominations Received

On the date of going to press the following nominations had been received:

Coming Events

Northern California Section

A field meeting of the Northern California Section will be held on June 5 and 6 in the Santa Cruz area.

Southern Tree Improvement Conference

The fifth Southern Tree Improvement Conference will be held June 11-12 at North Carolina State College, Raleigh.

Appalachian Section Summer Meetings

Three summer meetings by states planned as follows:

North Carolina: June 19-20 starting at Bridgewater Railroad Siding, N.C., with registration 1:30 PM on the 19th.

Virginia: July 31-Aug. 1, in the vicinity of Fredericksburg. Assemble at 12:45 PM on the 31st at the General Washington Inn.

South Carolina: was scheduled for May 29-30 at Georgetown, S.C.

Ozark Section

The Ozark Section will meet June 19-20 at Pine Bluff, Ark.

Kentucky-Tennessee Section

The summer meeting of the Kentucky-Tennessee Section will be held June 29-30 at the University of the South, Sewanee, Tenn. Theme: "Increasing Forest Production on the Cumberland Plateau."

National Shade Tree Conference

The 35th annual meeting of the National Shade Tree Conference will be held in the Statler Hotel, Detroit, Mich. August 17-21.

Northeastern Forest Tree Improvement Conference

The seventh annual Northeastern Forest Tree Improvement Conference will be held at the University of Vermont, Burlington, August 18-19.

Soil Conservation Society

The 14th annual meeting of the Soil Conservation Society of America will be held August 26-28 in Rapid City, S. Dak.

Society of American Foresters

Annual meeting—November 15-18, San Francisco, Calif.

For President

C. A. Connaughton, San Francisco, Calif. (Council member 1958-1959.)

Henry J. Malsberger, Atlanta, Ga. (Vice president 1958-1959.)

E. T. F. Wohlenberg, Ukiah, Calif.

For the Council

B. E. Allen, Savannah, Ga. (Council member 1956-1957 and 1958-1959.)

William C. Bramble, Lafayette, Ind.

S. T. Carlson, Santa Fe, N. Mex.

Donald E. Clark, Denver, Colo. (Council member 1958-1959.)

Robert W. Cowlin, Portland, Ore.

Kenneth P. Davis, Ann Arbor, Mich. (Council member 1958-1959.)

George A. Garratt, New Haven, Conn. (President 1958-1959.)

W. D. Hagenstein, Portland, Ore. (Council member 1958-1959.)

Albert G. Hall, Washington, D. C.

Svend O. Heiberg, Syracuse, N. Y.

Robert N. Hoskins, Richmond, Va.

Horace R. Josephson, Washington, D. C.

Clemens M. Kaufman, Gainesville, Fla.

Wm. Morris Palmer, Jr., Natchitoches, La.

Richard J. Preston, Raleigh, N. C.

Waller H. Reed, Chester, Calif.

Charles L. Tebbe, Missoula, Mont.

James K. Vessey, Atlanta, Ga.

John Zivnuska, Berkeley, Calif.

HARRY WM. DENGLER, *Chairman*
Nominating Committee

Fifth Call for Fellow Nominations

All Members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 5, 1959.

As defined by the Constitution (Article III, Section 7), "Fellows shall be foresters recognized generally throughout the profession as persons who have rendered outstanding service to forestry and to the Society. They shall be elected from the Members."

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters, hereby nominate John Doe for election to the grade of Fellow in 1959.

Remember these simple rules:

1. A petition may not name more than one candidate.

2. It must be signed by not less than 25 Members or Fellows in good standing.

3. It should be accompanied by a factual, not eulogistic, biographical sketch of at least 300 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society in Washington, D. C., not later than September 19, 1959.

The executive employees of the Society cannot be responsible for obtaining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing).

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows, the Council, the chairmen of the 21 Sections, and the chairmen of the 9 subject Divisions.

The system is described in Article IV, Section 4 of the Constitution. To win election a nominee must receive an affirmative vote of not less than one-half the total number of votes cast, as provided in Bylaw 11.

For the 1959 election there will be 128 electors, of whom 88 are Fellows. An elector has one vote only. A Fellow who is also a Council member has but one vote.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding service to forestry and to the Society. Fellows do not pay increased dues; their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 125 Fellows elected. At the present time the number of living Fellows is 88.

Since the last election in December 1957, three Fellows have died: S. R. Gevorkiantz of Minnesota, J. S. Holmes of North Carolina, and F. W. Morrell of Virginia.

A list of the current fellows was published in the May issue of the JOURNAL.

Fellow Nominations

On the date of going to press the following Members had been nominated for the grade of Fellow:

N. T. Barron, Franklin, Va.

Clifford H. Foster, Warrensburg, N. Y.

Bishop F. Grant, Athens, Ga.

Harold S. Newins, Gainesville, Fla.

Harold G. Wilm, Albany, N. Y.

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Washington 6, D. C.

Colleges and Universities in the United States Offering Instruction in Forestry (May 1, 1959)

Accredited

The following institutions are accredited for forestry instruction by the Council of the Society of American Foresters.

Alabama Polytechnic Institute, Department of Forestry, Auburn, Ala.

University of California, School of Forestry, Berkeley 4, Calif.

Colorado State University, College of Forestry and Range Management, Fort Collins, Colo.

Duke University, School of Forestry, Durham, N. C.

University of Florida, School of Forestry, Gainesville, Fla.

University of Georgia, School of Forestry, Athens, Ga.

University of Idaho, College of Forestry, Moscow, Idaho.

Iowa State University, Department of Forestry, Ames, Iowa.

Louisiana Polytechnic Institute, Department of Forestry, Ruston, La.

Louisiana State University, School of Forestry, Baton Rouge 3, La.

University of Maine, School of Forestry, Orono, Maine.

University of Massachusetts, Department of Forestry and Wildlife Management, Amherst, Mass.

Michigan College of Mining and Technology, Department of Forestry, Houghton, Mich.

Michigan State University, Department of Forestry, East Lansing, Mich.

University of Michigan, School of Natural Resources, Ann Arbor, Mich.

University of Minnesota, School of Forestry, St. Paul 1, Minn.

University of Missouri, School of Forestry, Columbia, Mo.

Montana State University, School of Forestry, Missoula, Mont.

State University of New York, College of Forestry, Syracuse 10, N. Y.

North Carolina State College, School of Forestry, Raleigh, N. C.

Oregon State College, School of Forestry, Corvallis, Ore.

Pennsylvania State University, School of Forestry, University Park, Pa.

Purdue University, Department of Forestry and Conservation, Lafayette, Ind.

Utah State University, College of Forest, Range and Wildlife Management, Logan, Utah.

University of Washington, College of Forestry, Seattle 5, Wash.

West Virginia University, Division of Forestry, Morgantown, W. Va.

Yale University, School of Forestry, New Haven 11, Conn.

Not Accredited

The following institutions offer professional and/or technical curricula in forestry, but do not meet the requirements for accreditation.

Arkansas Agricultural and Mechanical College, Department of Forestry, College Heights, Ark.

Arizona State College, Department of Forestry, Flagstaff, Ariz.

Stephen F. Austin State College, De-

partment of Forestry, Nacogdoches, Texas.

Clemson Agricultural College, Department of Forestry, Clemson, S. C.

University of Connecticut, Department of Forestry and Wildlife Management, Storrs, Conn.

Harvard University, Harvard Forest, Petersham, Mass.

McNeese State College, Department of Plant Science, Lake Charles, La.

Mississippi State University, School of Forestry, State College, Miss.

University of Illinois, Department of Forestry, Urbana, Ill.

University of New Hampshire, Department of Forestry, Durham, N. H.

Oklahoma State University of Agriculture and Applied Science, Department of Forestry, Stillwater, Okla.

University of the South, Forestry Department, Sewanee, Tenn.

Southern Illinois University, Department of Forestry, Carbondale, Ill.

Virginia Polytechnic Institute, Department of Biology, Blacksburg, Va.

Washington State University, Department of Forestry and Range Management, Pullman, Wash.

Introductory, Preforestry, and Specialized Courses

Abraham Baldwin Agricultural College, Tifton, Ga.

University of Arkansas, Department of Horticulture, Fayetteville, Ark.

Centenary College of Louisiana, Department of Biology, Shreveport, La.

Cornell University, Department of Conservation, Ithaca, N. Y.

Grand Rapids Junior College, Grand Rapids, Mich.

Humboldt State College, Forestry Department, Arcata, Calif.

Idaho State College, Pocatello, Idaho.

University of Kentucky, Department of Horticulture, Lexington, Ky.

Lassen Junior College, Division of Vocational Forestry and Lumbering, Susanville, Calif.

Marlboro College, Marlboro, Vt.

University of Maryland, Department of Horticulture, College Park, Md.

Nichols Junior College, Duddley, Mass.

North Dakota Agricultural College, Department of Horticulture and Forestry, Fargo, N. Dak.

North Dakota School of Forestry, Bottineau, N. Dak.

Northern Michigan College, Department of Conservation and Forestry, Marquette, Mich.

Northwestern State College, Agriculture Department, Natchitoches, La.

Ohio State University, Department of Horticulture and Forestry, Columbus 10, Ohio.

Paul Smith's College, Forestry Department, Paul Smiths, N. Y.

Pasadena City College, Pasadena 4, Calif.

University of Rhode Island, Forestry Department, Kingston, R. I.

Rutgers University, Department of Forestry, New Brunswick, N. J.

University of Tennessee, Department of Horticulture and Forestry, Knoxville 16, Tenn.

Texas A & M College, Department of Range and Forestry, College Station, Texas.

University of Vermont, College of Agriculture, Burlington, Vt.

Wisconsin State College, Botany Department, Superior, Wis.

University of Wisconsin, College of Agriculture, Madison, Wis.

Ranger Schools

State Forest Ranger School of the University of Florida, Lake City, Fla.

State Ranger School of State University College of Forestry, Wanakena, N. Y.

MEMBERS of the Washington, D. C. Section held an all day field trip to the Beltsville Experiment Station on April 30 and viewed research work in progress in forestry and related fields. New officers for the coming year were installed. They are as follows: Chairman, James Owens; vice chairman, Howard G. Lyon, Jr.; secretary, Paul C. Lemmon.

Columbia River Section Holds Annual Meeting

The annual meeting of the Columbia River Section was held April 17 and 18 at Eugene, Ore. with headquarters in the Eugene Hotel. Attendance of members and guests totalled more than 300.

A feature of the first day was a forum discussion of annual allowable cuts on federal forest lands in Oregon. Alex J. Jaenicke served as discussion leader.

The participants were Walter H. Lund of the U. S. Forest Service, Russell Getty of the Bureau of Land Management, Earle R. Wilcox of the Bureau of Indian Affairs, and L. B. Alexander of Mason, Bruce and Girard.

Chairman Robert O. Hostetter presided at the business sessions. Com-

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mittee reports were made on finances by Clyde Stratton; on membership by Robert Mason; on water management by W. K. Ferrell; and on the regional soils committee by Theodore Yocum. Henry Clepper reported on Society affairs.

Announcement was made of the election of Martin L. Syverson as chairman of the Section to take office July 1, 1959; and of Spencer T. Moore as vice chairman elect.

A second panel discussion was held on the subject of public relations. Leader was Hardin R. Glascock and the speakers were Irvin H. Luiten of Weyerhaeuser Timber Company and Henry W. De Bruin of the U. S. Forest Service.

A critical review of American and European forestry was made by a panel whose leader was Walter G. Thomson. Joseph Strach, a former European forester, spoke of forestry in America; Leo A. Isaac, well-known forester of the Pacific Northwest, spoke on European conditions.

Dr. D. S. Jeffers was moderator of a discussion "Where Do We Stand in Fifty-Nine?" Speakers were R. M. Kallander, representing research; L. B. Alexander, continuous forest inventory; E. G. Dunford, watershed management; W. Richardson, hardwood utilization; and D. D. Robinson, fire control.

The concluding panel discussed current legislation and its impact on forestry. T. J. Starker was leader. Speakers were W. D. Hagenstein on federal legislation; Charles Ogle, on Oregon state legislation; and F. J. Sandoz, on taxation in Oregon.

A social hour preceded the Section's dinner, which was served to 260 members and their ladies. Chairman Hostetter presided. Featured speakers were Warne Nunn, assistant to Governor Hatfield; Henry Clepper; and Herbert Lundy, editor of the editorial page of *The Oregonian* of Portland.

The 1960 annual meeting will be held in Roseburg, Ore. April 15 and 16.

Recommended Logging Practices for Watershed Protection in Western Oregon

Society of American Foresters
Columbia River Section
Water Management Committee

1. The Columbia River Section, Society of American Foresters, upon referendum of the members, presents the following recommendations.

The recommendations have been prepared primarily from the following points of view:

a. They apply to lands of western Oregon where rainfall is high (35 inches or more per year);

b. They are concerned with practices influencing accelerated erosion, water quality, and site deterioration;

c. They consider the impact of practices over the long period (though short-term effects are not ignored); and

d. No general prescription can be written to apply equally well on all watersheds in this large area; general guides can be established, but they will be ineffective unless interpreted and applied intelligently to fit local conditions.

2. Some of the proposals recognize good practices currently used in logging operations and recommend their continuance. Some proposals go beyond current practice and will require

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extra work and extra expense in order to minimize watershed damage. The final test of such proposals is their effectiveness on the watershed, and examinations in the field are essential.

3. The recommendations are not considered to be final. Rather they constitute a beginning in the task of harmonizing two land uses—the production of wood and water from the same ground. Both must be produced in the economy of the West; successful reconciliation of these two uses creates a problem which will require the utmost cooperation among landowners, logging operators, and foresters. Each of these three must assume responsibility to apply proper watershed practices.

Recommended practices are outlined in the order in which problems occur in logging operations.

Lay-out and Planning

1. Locate cutting areas and plan road lay-out for the drainage in advance, considering the protection of soil, water, and fish. Make every effort to develop general drainage plans jointly with all owners in the area.

2. Avoid putting roads into areas where severe disturbances are difficult to avoid, but if this is impossible carefully plan logging methods adapted to such situations.

3. Locate landings as much as possible in easily drained areas to avoid mud accumulation, so that skid roads will not contribute excessive drainage into them, and away from streams where feasible, so that landing mud will settle out before it reaches the stream.

Road Location and Design

1. Where possible, locate roads on benches and ridges to minimize erosion; except under special circumstances such as occurrence of rock bluffs, keep roads out of stream courses. Roads should be high enough to prevent silting to the stream.

2. Keep road gradients low except where short steep sections are needed to take advantage of favorable topography and to avoid excessive cut and fill. Minimize the effect of higher gradients by reducing the distance between culverts, to prevent the accumulation of water in the ditches.

3. Roads leaving landings should have short lengths of slightly adverse grade if possible. They should not have steep pitches of favorable grade which might drain off mud from the landings into streams.

4. Allow flexibility in road design so that in construction a minimum of soil is moved. Adjust the radius of curves in critical areas to achieve this objective.

5. Take advantage of well-drained soils and horizontal rock formations for greater stability, and avoid areas where seeps, clay beds, concave slopes, alluvial fans, and steep dipping rock layers indicate the possibility of slides.

6. Consider the proper angle of repose for cuts and fills in designing roads on varying types of soils and rock materials. Consistent with these demands, make road cuts reasonably steep in order to minimize surface exposed to erosion.

7. In bridge location plan to avoid relocation of the stream channel. Where the stream must be changed, use rip rap, vegetative cover, or other means to reduce soil movement into streams.

8. Install culverts at crossings of all drainage ways except small streams and seeps which can be safely diverted to ditches. Use culverts with sufficient capacity to carry the largest flow expected.

9. Route the road drainage (whether from culverts, cross drainage, or ditches) onto the forest floor, preferably on benches so that sediment can settle out before drainage water reaches stream channels. However, where experience has shown that new erosion channels would be formed on steep slopes from such practices it would be better to route the water to established channels. Plan culverts where sedimentation can best be controlled.

10. Take drainage water out of ditches at intervals short enough to prevent ditch erosion. Detour it from above unstable areas to avoid saturation, slumping, and erosion.

Road Construction

1. Plan the pioneering stage of road construction to avoid soil erosion and slumpage. As an example, cull log crossings can be provided where culverts will be placed on the completed road. Avoid pioneering too far ahead of final construction.

2. Uncompleted road grades which may be subject to considerable washing before final grading should be outsloped or cross drained.

3. Hold wet weather road building to a minimum, particularly on poorly drained, erodible soils which may drain mud directly to streams.

4. Build fills in lifts to insure optimum compaction and minimize slump-

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age. Avoid the inclusion of slash, logs, other organic debris in fills.

5. Excess fill material should not be dumped within the high water zone of streams where floods can pick it up or where it will flow immediately into the stream; end-haul such material.

6. Where slide areas can be predicted from past experience, their effects should be minimized by such measures as flatter backslopes and deeper ditches. On slopes gentle enough to hold the fill, avoid disturbance of underground water courses by building on the fill and providing adequate subdrainage.

7. On primary roads with steep slopes and full benching, consider the use of cribbing to avoid severe disturbance to unstable slopes.

8. On primary roads wherever serious erosion is likely, large cut-and-fill slopes should be stabilized with plant cover as soon as possible. Local experience will indicate the best practices and species to use.

9. Avoid channel changes or disturbance of stream channel. Where necessary complete the channel, change and rip-rap the sides before turning the water into the new channel.

10. In building bridge footings and abutments, limit machine work as much as possible to avoid disturbing the stream. This initial work often greatly increases turbidity and sediment movement. The toes of fills on larger creek crossings should be protected above the high water line to prevent soil movement.

11. Unless no other source is available, gravel should not be taken from stream beds except from dry gravel bars. Washing of gravel into streams will normally cause sedimentation and should be avoided.

12. Culverts should be properly installed in the stream channel allowing for suitable bed, adequate size, frequency, and grade. Inlets and outlets should be protected. Aprons should be installed where needed.

13. Where necessary protect the upper ends of culverts to prevent fill erosion into them. On erodible soil materials, extend culverts beyond the fills or install permanent aprons below them to disperse the flows and prevent gullying.

14. Ditches should be of adequate depth and side slope to carry all water and to prevent sloughage.

Road Maintenance

1. Keep roads well crowned ahead of wet weather so they will drain properly and not become waterways.

2. During current operations, roads should be graded and ditched to avoid interruption to drainage from road centers to the ditches.

3. After the first rain in the fall, check roads to reduce drainage problems.

4. During periods of heavy rainfall, examine road surfaces to assure that drainage from wheel ruts is properly diverted to drainage ditches. During such periods it may be worthwhile to provide personnel to patrol the roads and to do hand drainage work.

5. Provide frequent cross-drains on all temporary roads in the fall to prevent erosion of road and fill.

6. Generally, berms should be removed or at least broken frequently to allow lateral drainage to nonerodible areas. Berms are desirable on large erodible fills to prevent drainage from the road crown down the center of the fill section.

7. In using graders to clean out drainage ditches, avoid undercutting the side slopes.

8. Culvert inlets should be inspected and cleaned prior to the rainy season and periodically during that season. For at least 50 feet above culverts the stream channels should be cleared of wood materials that might clog the culverts. The outflow should be kept clear also.

9. Install trash racks well above inlets to culverts where experience shows the necessity. Keep the racks cleaned out.

Logging Operations

1. Falling and bucking.

a. Avoid falling trees into or across streams whenever choice of a "lay" is possible. Particularly avoid falling that will leave tops and branches in the stream after yarding.

b. Leave windfirm, noncommercial species such as yew, maple, and the like to protect the streambank and to maintain optimum stream temperatures.

2. Cable logging.

a. Cable log uphill as much as possible.

b. Avoid yarding by high-lead across streams unless local practice has shown that it is possible without injury to the stream. Give close supervision to such yarding.

3. Tractor logging.

a. The use of tractors without watershed damage requires careful control. Generally, tractor operations should be restricted on steep slopes and immediately after rains depending on local soil conditions.

b. Downhill tractor logging should

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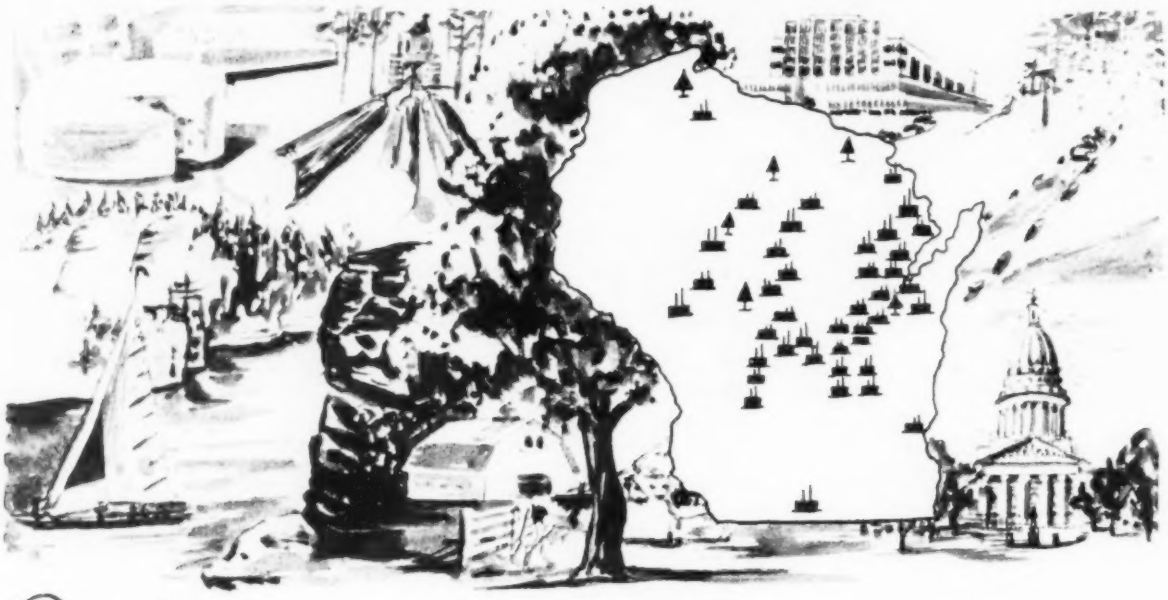

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In addition to their natural association with recreational facilities, the state's forests supply economically important forest product industries, including veneer and paper making and finishing industries.

The Wisconsin Conservation Department, besides controlling state forests, cooperates with counties in management of the more than 2 million acres of county forests. A successful fire protection record is the result of an efficient system of towers and communication, as well as an effective public information program which has gained popular support for the conservation aim.

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be closely supervised to minimize erosion.

c. Where tractor logging across streams is necessary, it should be done across temporary culverts of logs which are to be removed later. Tractors should not yard straight down the stream bottom.

d. Lay out skid trails where they can be drained.

4. General.

a. Take logging debris out of stream channels. If some temporary clogging occurs, make sure the debris is removed from the channel before abandoning the logging area.

b. Keep spur roads and skid trails well drained by frequent diversion of drainage water onto areas where sediment can settle out. Drain the skid trails before they reach landings. When skid trails are out of use, excavate water bars to divert drainage and prevent accumulations that may cause gullying.

c. Avoid dumping of waste soil in or near water courses.

d. Drain fire lines by construction of water bars or by rolling the fire line slightly from one side of the ridge to the other to put water into undisturbed areas.

Post Operational Clean-Up and Maintenance

1. Remove temporary bridges and culverts after the logging operation to prevent their later blocking of the stream.

2. Periodically inspect drainage previously established through proper construction of skid trails, landings, spur roads and fire lines, and maintain to prevent the undoing of prior good work.

Water Management Committee,
Columbia River Section

A Resolution for the Improvement of the JOURNAL OF FORESTRY

There is concern in the Capital Chapter of the Society of American Foresters as to the acceptance of the JOURNAL OF FORESTRY by the members. It is believed that this feeling also exists among the members of other Chapters. The JOURNAL as the organ of the membership should from time to time be revised and improved to keep pace with changing times to best serve the needs of the membership. It should be a vital communication force in the development of forestry and in Society affairs. To accomplish this, it must be widely read by the members, resulting in a stronger cohesion of foresters and a stronger effort to promote the profession, and the development of personal pride in the field of forestry. The latter should be a major goal of the JOURNAL.

The Capital Chapter has made a study of the JOURNAL in an effort to offer suggestions which might make it more popular among a larger percentage of the members. As a result, the following resolution is respectfully submitted:

Be it hereby resolved by the Capital Chapter of the Society of American Foresters that much constructive and useful action can and should be taken

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FOREST FIRE: CONTROL AND USE by Kenneth P. Davis, Professor of Forest Management, and Chairman of the Department of Forestry, School of Natural Resources, University of Michigan. *McGraw-Hill American Forestry Series.* 584 pages, $12.00

NATURAL RESOURCES by M. R. Huberty, Department of Engineering, University of California, Los Angeles; and W. L. Flock, Associate Engineer and Lecturer, Department of Engineering, University of California, Los Angeles. *McGraw-Hill UCLA Extension Series.* In Press.

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to enable the JOURNAL OF FORESTRY to better serve the needs of the Society. Following are listed a number of recommendations and suggestions which it is requested be given consideration and attention:

1. Develop a new format which will give the JOURNAL more reader appeal by avoiding the repetious style and including a wider use of pictures.
2. Encourage the submission of articles by foresters in all phases of forestry. In this connection, a Section committee might be appointed to encourage more local articles.
3. Publish articles of wider and more general interest to a larger segment of the membership. Articles of specific interest to only a minor segment of the membership, because of subject matter or of only local value, might be published in brief, followed by a note informing where the entire articles can be obtained.
4. Precede by a summary those articles dealing with a specific technical problem. This would allow readers to get the "meat" of the article without having to study it in its entirety.
5. Emphasize news dealing with Chapter and Section affairs. Local correspondents could provide this information to the JOURNAL staff.
6. Increase the extent of travel done by the editor so that he may become more sensitive to the desires of the membership, and keep personally in touch with forestry and associated activities.
7. Air current controversial issues.
8. Analyze and review current bills and legislation concerning forestry and related fields each year before the Congress convenes and during the session.
9. Occasionally print outstanding talks to add variety.
10. Make the obituary section more current and inclusive.
11. Expand the "Coming Events" section to include a complete calendar of conferences, meetings, etc. in forestry and related fields.
12. Feature a prominent forester each month, and rotate this among industry, state and federal foresters and foresters in teaching and research work.
13. Provide at least one feature article each month on a state, region, S.A.F. Section, Chapter, or an area of special interest.

Forestry is not all research. Because the JOURNAL OF FORESTRY is considered a scientific organ, it is not necessary to devote the entire publication to this matter. Instead, the JOURNAL should serve, insofar as possible, to keep the membership informed on timely subjects which can include research, but certainly not to the exclusion of other material.

Be it further resolved that the Chapter forward this resolution to the Columbia River Section for action at the April Annual Section Meeting, and that the Section forward it to the Council for their action.

JAMES JOHNSTON
Chairman, Capital Chapter,
Columbia River Section,
Society of American Foresters,
Salem, Ore.

Southwestern Section Meeting

The Southwestern Section met April 17 and 18 in Santa Fe, N. Mex., in Mabry Hall, State Capitol Building, with C. A. Merker, supervisor of the Santa Fe National Forest playing host. Approximately 80 members attended. Friday morning the business meeting got underway conducted by Chairman Arthur Upson. The afternoon program was guided by Dahl Kirkpatrick, Forest Service assistant regional forester in charge of timber management. First speaker was State Forester Ray Bell who discussed the New Mexico state forestry program, present and future. Following this Robert Dunstan of the State and Private Forestry Section, Forest Service, talked on federal aid now available in forestry and how it applies to the Southwest. A panel discussion was next, with Mr. Upson as moderator. Panel members were Ewing McClain, Soil Conservation Service extension forester from Raton; Yale Weinstein and Duncan Lang of the Duke City Lumber Company; Everett Doman, supervisor, Lincoln National Forest (Alamogordo, N. Mex.); and Thomas Gallagher, owner of the New Mexico Timber Company. Topic was the stimulating of interest in good forest management on the part of the smaller private owners of timberlands in the Southwest.

Toastmaster at a banquet Friday evening at La Posada was Fred H. Kennedy, southwestern regional forester. Dr. George Garratt, president of the Society and dean of Yale Forestry School, was speaker of the evening. He spoke on "Conflict in Land Use and Management."

Saturday the foresters traveled afield to see timberland management as practiced on the Baca Location and San Diego Grants of northern New Mexico.

Foresters Invited to Apply for Entry in Scientific Directory

The tenth edition of *American Men of Science*, a biographical directory, is now in the process of being prepared on the campus of Arizona State University, Tempe. Jaques Cattell, editor, invites those readers of the JOURNAL who are actively engaged in the profession of forestry and believe they are eligible for inclusion in the directory to request questionnaires from his office at 820 College Avenue, Tempe, Ariz.

The following criteria explains in concise form the qualifications required:

1. Achievement, by reason of experience and training, of a stature in scientific work at least equivalent to that associated with the doctorate degree, coupled with presently continued activity in such work; *or*

2. Research activity of high quality in science as evidenced by publication in reputable scientific journals; or, for those whose work cannot be published because of governmental or commercial or industrial security, research activity of high quality in science as evidenced by the judgment of the individual's peers among his immediate co-workers; *or*

3. Attainment of a position of substantial responsibility requiring scientific training and experience of approximately the extent described for (1) and (2).

Mr. Cattell is especially eager to hear from members of industrial organizations who are engaged in research. Undoubtedly, there are a number of people in forestry who should be included in the tenth edition but have not been nominated.

Also, those included in the ninth edition who have not received their questionnaires should notify Mr. Cattell immediately.

Willard R. Hine (1897-1959)

Willard R. Hine, first full-time executive secretary of the Society of American Foresters, died March 18 in Atlanta, Ga. at the age of 62.

In December 1957 Mr. Hine retired from the U. S. Forest Service after a total of more than 30 years' service. During the 10 years before his retirement he was assistant regional forester in charge of the Division of Information and Education in the Southern Region.

He first entered government service in 1921 at the Southern Forest Experiment Station. In 1925 he resigned to accept a position as state forester of Louisiana and remained in that position until 1929. He returned to the Forest Service for a short time. In 1930 he took the executive secretary's post with the Society but was forced to resign because of ill health a year later. After his recovery he once again returned to federal employment.

Born in Gloversville, N. Y. January 2, 1897, Mr. Hine studied at Cornell and received his B. S. degree from there in 1920. The following year he served as instructor while he continued his studies and received his M. S. degree in 1921.

Ralph Wakeman Foster (1928-1959)

Ralph W. Foster, 30, died of acute leukemia at Aiken, S. C., on February 3, after an illness of two months.

Dr. Foster was born at Winchendon, Mass., May 11, 1928. He grew up with the white pines at the Pack Demonstration Forest at Warrensburg, N. Y. His father, Clifford H. Foster, has been director of this forest since its establishment.

He graduated from Phillips Exeter Academy in 1946 and attended the State University College of Forestry at Syracuse, where he was granted a B. S. degree in 1950 and an M.F. in forest economics in 1951. From 1951 to 1954 he was an officer in the Navy, attaining the rank of lieutenant (j-g) and finally serving as navigator and command duty officer of the U. S. S. *Capricornus*, an attack cargo ship, in the Atlantic. He studied at Yale University from 1955 to 1958, when he secured the Ph.D. degree in silviculture.

He had been assistant forester on the staff of the U. S. Forest Service at the Savannah River Project of the Atomic Energy Commission since June 1958.

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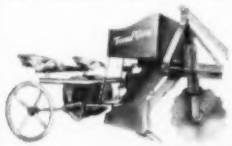

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Puget Sound Section Holds Annual Meeting

With an attendance of nearly 300 members and guests, the annual meeting of the Puget Sound Section was held April 10 in Tacoma, Wash. at the Winthrop Hotel.

A morning technical session had as its theme "Establishing the New Forest." John W. Duffield served as moderator of the following panel papers.

"Seed Orchards and Tree Improvement Breeding" by Robert K. Campbell, College of Forestry, University of Washington.

"How Fertilization of Forest Soils Assists Growth" by E. C. Steinbrenner, Weyerhaeuser Timber Company.

"Methods of Alleviating Wildlife Damage to Forest Crops" by Nelson B. Kverno, U. S. Fish and Wildlife Service.

"Regeneration Problems of the East Side" by Robert L. McNeil, U. S. Forest Service.

The keynote address of the afternoon session was given by John L. Aram of Weyerhaeuser Timber Company on "The Market Challenge of Forest Utilization."

ROBERT AUFDERHEIDE

A second panel discussion on "Utilizing the New Forest" was moderated by John W. Allen.

Speakers were Norman P. Worthington of the U. S. Forest Service, Ben S. Bryant of the University of Washington, and T. Robert Sheldon of Scott Paper Company.

Section Chairman George Staebler presided at a panel discussion on "Improving Professional Forestry by Building a Better Section."

Panel members were Robert Hostetter, chairman of the Columbia River Section; George F. Weyerman, chairman of the Inland Empire Section; J. Harry G. Smith, chairman of the Vancouver Section, Canadian Society of Forest Engineers; and Henry Clepper, SAF executive secretary.

The Section's annual dinner was sponsored jointly with the Keep Washington Green Committee. Will Rogers, Jr., of Beverly Hills, Calif., was the featured speaker. David James of Simpson Logging Company was toastmaster.

Robert Aufderheide (1909-1959)

Robert Aufderheide, supervisor of the Willamette National Forest, Eugene, Ore., passed away March 28.

Born in Clemens, Minn., March 17, 1909, Mr. Aufderheide spent his boyhood in Oregon. He received his degree in forestry from Oregon State College in 1935, and had been forest supervisor of the Willamette since 1954.

He began his career in 1934, working on various assignments until he received his forester appointment on the Rogue River National Forest in 1935. A year later he was transferred to the Siuslaw National Forest. He was promoted in 1946 to forester-in-charge, Western Oregon Work Center (now Willamette Research Center) of the Pacific Northwest Forest and Range Experiment Station at Corvallis. Four years later he was chosen to fill the forest supervisor vacancy on the Umpqua National Forest, Roseburg, which position he held until his promotion and transfer to the Willamette.

Mr. Aufderheide's work was recognized in the House of Representatives by Congressman Porter whose remarks appeared in the *Congressional Record* on March 5. On March 9 Senator Neuberger, in the U. S. Senate, singled him out for praise.

Dues Deadline June 30

Members who have not paid their 1959 dues will receive a letter and a third dues reminder this month. Members whose dues are not paid by June 30 will be declared in bad standing. They will not receive the JOURNAL OF FORESTRY, be a candidate for office, or be eligible to vote until their dues are paid. If you have not mailed your payment for 1959 dues, do it today so you will not be declared in bad standing.

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Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of April are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of July 1959.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allison, R. B., Staff Forester, USFS, Logan, Utah (Junior, **Intermountain**).

Alves, A. S., Chief Forester, Panamericana Textil S. A., Campinas, Estado de Sao Paulo, Brazil (Corresponding).

Bardwell, J. L. (Student, **L.S.U.**).

Barinaga, J. F., Cordwood Buyer, Crown Zellerbach Corp., Port Angeles, Wash. (Junior, **Puget Sound**).

Becker, S. I., Grad. Student, Pa. State Univ., State College, Pa. (Junior, **Allegheny**).

Beebe, R. R., Pole Logging Supt., Neils Lumber Co., Libby, Mont. (Junior, **Northern Rocky Mountain**).

Bjornsen, A. M., Hammon, Jensen & Wallen, Mapping & Forestry Services, Oakland, Calif. (Junior 1953; Member, **Northern California**).

Blanchard, W. H., Asst. Dist. Administrator, State Dept. Natural Resources, Forks, Wash. (Affiliate, **Puget Sound**).

Boustead, L. E., Land Agent, Weyerhaeuser Timber Co., Springfield, Ore. (Junior, **Columbia River**).

Bradley, S. P. (Student, **Univ. Calif.**).

Brannon, J. C. (Student, **Univ. Fla.**).

Brett, R. M., Retired, South Royalton, Vt. (Associate, **New England**).

Burtis, J. J. (Student, **Univ. Mich.**).

Cambre, L. A., Forester, USFS, Forest, Miss. (Affiliate, **Gulf States**).

Campbell, D. R. (Student, **Univ. Calif.**).

Cloutier, G. F., Service Forester, State Park & Forest Comm., Hartford, Conn. (Affiliate 1954; Junior, **New England**).

Cone, R. A. (Student, **Iowa State**).

Czemerys, J. J., Forester, Hemlock Ranger Sta., Carson, Wash. (Junior, **Columbia River**).

Dederick, C. R., Camp Supt., Dept. of Natural Resources, Olympia, Wash. (Junior, **Puget Sound**).

DeRolf, W. H. (Student, **Univ. Fla.**).

Dews, D. L. (Student, **Univ. Idaho**).

Duckett, H. E., County Forester, State Forest Service, Montpelier, Vt. (Rein.; Junior, **New England**).

Dunham, D. T. (Student, **Univ. Fla.**).

Eckford, J. W. (Student, **Univ. Fla.**).

Egerman, K. J., No. 8 Fergus, Missoula, Mont. (Student 1958; Junior, **Northern Rocky Mountain**).

Ewing, A. D., Forester, Western Forest Industries Assoc., Eugene, Ore. (Junior 1955; Member, **Columbia River**).

Fago, C. E., Research Asst., Univ. of Ill., Urbana, Ill. (Junior, **Central States**).

Fast, R. J., Dist. Forester, W. Va. Pulp & Paper Co., Walterboro, S. C. (Junior 1955; Member, **Appalachian**).

Fogg, P. J. (Student, **L.S.U.**).

Frizzell, M. M., Forester, Bur. of Land Mgmt., Sacramento, Calif. (Junior 1952; Member, **Northern California**).

Garrett, W. G., Asst. Dist. Forester, Gulf States Paper Corp., Carrollton, Ala. (Junior 1955; Member, **Southeastern**).

Goodrich, D. S., Asst. Dist. Ranger, USFS, Baker, Ore. (Rein.; Junior, **Columbia River**).

Halverson, H. G. (Student, **Iowa State**).

Hanson, R. M., Forester, West Tacoma Newsprint Co., Cosmopolis, Wash. (Rein.; Junior, **Puget Sound**).

Hess, J. A., Supv., USFS, Bend, Ore. (Junior 1955; Member, **Columbia River**).

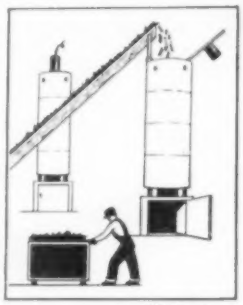
Hill, J. F. (Student, **Univ. Ga.**).

Hills, F. M., Logging Supt., J. Neils Lumber Co., Glenwood, Wash. (Rein.; Junior, **Columbia River**)

Howard, V. M., Forester, Portland Manufacturing Co., Portland, Ore. (Junior 1955; Member, **Columbia River**).

Korth, W. R., Product Application Eng., International Harvester Co., Melrose Park, Ill. (Junior 1954; Member, **Central States**).

Krauss, P. E., Dist. Administrator, Dept. of Natural Resources, Glenwood, Wash. (Junior, **Columbia River**).



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Ku, T. T., Asst. Prof., Ark. A&M College, College Heights, Ark. (Junior, **Ozark**).

Manthey, E. G., Forester, USFS, Parkdale, Ore. (Junior, **Columbia River**).
Moholt, P. A. (Student, **Univ. Mich.**).
Moody, W. C., Forester, Champion Paper & Fibre Co., Edgefiels, S. C. (Junior, **Appalachian**).

Nagel, S. R., Forester, U. S. Dept. of Agric., Heppner, Ore. (Junior, **Columbia River**).
Nelson, H. F., Forester, Self, Sandpoint, Idaho (Rein.; Junior, **Inland Empire**).

O'Donnell, A. R., Asst. Supv., Dept. Natural Resources, Olympia, Wash. (Affiliate 1951; Junior, **Puget Sound**).
On, D., Forester, Ant Flat Ranger Sta., Fortine, Mont. (Junior, **Northern Rocky Mountain**).

Paulsen, T. T., Log Buyer & Forester, Mt. Adams Forest Prod., Bingen, Wash. (Affiliate, **Columbia River**).
Peltier, E. L., Asst. Forest Supv., Willamette Natl. Forest, Eugene, Ore. (Rein.; Junior, **Columbia River**).
Pesonen, D. E. (Student, **Univ. Calif.**).
Plumb, T. R., Research Forester, USFS, Glendora, Calif. (Junior, **Southern California**).
Porter, J. E. C. (Student, **Univ. Calif.**).

Rademacher, R. J. (Student, **Univ. Minn.**).
Rankin, D. C. (Student, **Purdue.**).
Rianhard, G. Z. (Student, **Univ. Fla.**).
Rodewald, J. S., Dist. Forester, Minn. Forest Service, Park Rapids, Minn. (Rein.; Junior, **Upper Mississippi Valley**).
Romeril, A. B. (Student, **Univ. Mich.**).
Ronald, J. L. (Student, **Univ. Calif.**).
Rose, K. H. (Student, **Univ. Maine**).
Ruth, J. D. (Student, **Univ. Calif.**).

Sahonchik, A., Timber Cruiser & Land Appraiser, Gustina Bros. Lumber Co., Eugene, Ore. (Junior, **Columbia River**).
Shaddox, R. D., Forester, USFS, Winnfield, La. (Affiliate, **Gulf States**).
Sundstrom, C., 4224 O St., Philadelphia, Pa. (Student 1956; Junior, **Allegheny**).

Taylor, R. F., Supt., Univ. of Maine Forest School, Orono, Maine (Affiliate, **New England**).
Tokarczyk, R. D., Forester, USFS, Trout Lake, Wash. (Affiliate, **Columbia River**).
Tom, L. C., Asst. Dist. Forester, Bowaters Southern Paper Corp., Jasper, Ala. (Junor 1953; Member, **Southeastern**).
Tyrrel, R. R. (Student, **Univ. Iowa**).

Venners, H. W., Inspector, Western Electric Co., Indianapolis, Ind. (Junior 1953; Member, **Central States**).

Waid, L. A., Forester, USFS, Ukiah, Ore. (Junior, **Columbia River**).
Wessbecher, H. O., Forester, USFS, Parkdale, Ore. (Rein.; Junior, **Columbia River**).
Wilson, C. T. (Student, **Univ. Ga.**).
Woodham, B. T., Forester, Rome Kraft Co., Rome, Ga. (Junior, **Southeastern**).

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Forestry News

Yale Dedicates New Greeley Laboratory

Yale University's new $600,000 laboratory for its School of Forestry was dedicated May 8 at New Haven, Conn. in conjunction with the spring meeting of the Yale University Council. It is named the William B. Greeley Memorial Laboratory in honor of the late Col. Greeley, a 1904 graduate of Yale who became one of the country's most distinguished foresters.

The laboratory will be used for graduate instruction and research in forest biology and wood technology. The school occupies two other buildings in New Haven—Sage-Bowers Hall and Marsh Hall.

The new Greeley building, adjacent to Marsh Hall, measures 100 by 164 feet and contains laboratories for work in the various areas of wood technology, forest ecology, forest genetics, and tree physiology. The one story structure, with basement, is of unusual design. Walls are of glass and marble-chip, precast concrete, with "Y" shaped concrete columns supporting the roof. Wood block flooring, wood veneer paneling, and wooden laboratory furniture and fixtures which decorate and functionalize the interior were gifts from a number of forest product manufacturers and distributors. Immediately adjacent to the building is a greenhouse equipped with special control mechanisms for research work.

The additional facilities provided by the laboratory and greenhouse will make it possible to increase the Forestry School's maximum enrollment to approximately 75 graduate students. During the past six years the faculty of the School has more than doubled to its present number of 19 men.

School of Forestry Dean George A. Garratt presided over dedication ceremonies held in the late afternoon. Arthur W. Greeley, Yale forestry class of 1935, assistant chief of the U. S. Forest Service, and son of William B. Greeley, spoke on behalf of the Greeley family.

Charles F. Clise of Seattle, Wash., past chairman of the University Council's Committee for the School of Forestry, made formal presentation of the building on behalf of its donors.

Mr. Clise outlined Col. Greeley's notable life career in forestry and his interest in and long service to Yale, which began shortly after his graduation and continued until his death in 1955. As a member of the Committee on the School of Forestry Mr. Greeley actively promoted a long-range development program for the School, a feature of which were plans for the new laboratory. He was responsible for raising a major portion of funds received by the School from 1950 to 1955. Donors of money and material which made the building possible include forest industries, foundations, alumni and other individuals. Funds to complete the building were provided by the John A. Hartford Foundation.

Norman S. Buck, provost of the University, accepted the laboratory on behalf of Yale. After the dedication

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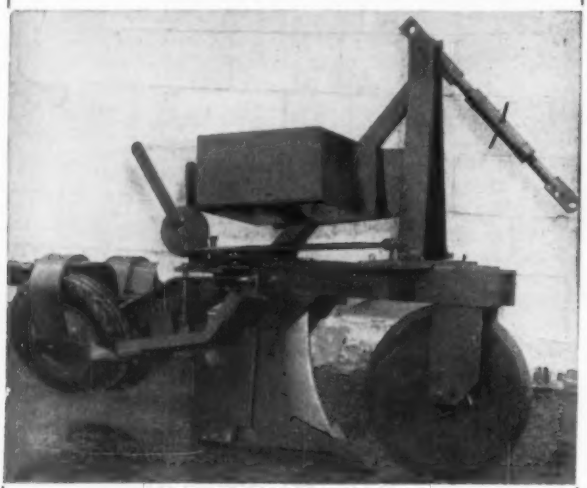

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THE WILLIAM B. GREELEY MEMORIAL LABORATORY, Yale University School of Forestry, New Haven, Conn.

program some 200 guests toured the building and grounds, following which a reception concluded the day's activities.

Yale twice before has honored Mr. Greeley. The first time was in 1927 when he received an honorary M.A. degree, the second four years ago when he received the Yale Medal, awarded by the Yale Alumni Board to those who have made an outstanding contribution to the University.

Among those in attendance at the dedication were Frederick K. Weyerhaeuser, Yale class of 1917, of Tacoma, Wash. who is presently chairman of the University Council Committee on the School of Forestry, and two members of his committee, B. Frank Heintzleman, class of 1910, former governor of Alaska, and Corydon Wagner, 1916, of Tacoma, Wash.

Communications Association to Meet

The Tenth Annual Conference of the Forestry, Conservation Communications Association will be held at the Arlington Hotel, Hot Springs, Ark., on July 15, 16, and 17, 1959.

An interesting program has been arranged to include the presentation of papers by qualified speakers on such subjects as Frequency and Modulation Measuring Equipment for the New Split Channel Requirements Mobile Antenna Design, Application of Selective Signaling Devices, Utilization of Existing Governmental Agencies in Civil Defense, Current FCC Dockets and Rule Proposals Affecting Public Safety Radio Services, etc.

Representatives of the FCC, U. S. Forest Service, and OCDM will be present, and manufacturers of radio communications and test equipment will participate in the program, displaying and demonstrating their latest products.

Members of the Association include representatives of all the state forestry, game and fish, and other conservation agencies in the nation.

Wirth Wins Civil Service League Award

Conrad L. Wirth, director of the National Park Service, Department of the

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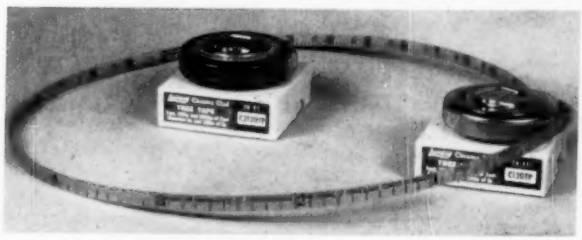

For years foresters have asked for diameter tapes on which the diameter figures read "right side up" when case is held in the right hand. Foresters also wanted the tape chrome clad (no rust) with easy-to-read black figures and graduations (they won't rub off) on a pearl-gray background.

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Interior, was one of ten government career men selected for 1958 outstanding service awards by the National Civil Service League.

Expanded Insecticides Research Bills Introduced

Identical bills for an expanded research program into the effects of pesticides on fish and wildlife have been introduced by Congressman Lee Metcalf of Montana and Senator Warren G. Magnuson of Washington. The bills, H.R. 5813 and S. 1575, seek $2,565,000 annually for basic research. The need for such a program and the ways in which the increased funds could be used were detailed by Congressman Metcalf.

Fire Losses on Interior Lands Decline

Fire losses on Department of the Interior forest and rangelands were less in 1958 than in 1957 although a greater number of fires occurred, according to the annual fire report of the department.

PETER S. GREENWOOD of Tacoma, Wash., has been elected president of the Keep Washington Green Association for 1959. Greenwood will succeed Ralph Backstrom of the Great Northern Railway, who headed the fire-prevention organization for the past two years.

A University of Washington graduate, Greenwood is manager of the timber department for the West Tacoma Newsprint Company of Steilacoom.

In 1958, there were 3,490 fires compared to 2,471 in 1957. The area burned during 1958 totaled 856,242 acres, compared to 5,220,070 acres burned in 1957. The 10-year average is 1,231,289 acres burned. In 1957, 403 fires in Alaska destroyed 4,839,281 acres, accounting for the high 1957 loss.

Lightning caused 1,680 fires compared to 1,014 in 1957 and the 10-year average of 1,008. Man-caused fires in 1958 numbered 1,810 compared to the 10-year average of 1,440 and the 1957 total of 1,457. Camp fires, debris burning fires, and miscellaneous fires were above the 10-year average, while smoker and railroad fires remained almost constant.

Lumbering operations has the best record of reportable causes with only 14 fires during the year.

The area of forest lands burned over was 229,189 acres or 27 percent of the total area burned. The 10-year average is 421,529 or 34 percent of the total area.

Low fire losses were reported by the National Park Service and the Bureau of Sport Fisheries and Wildlife. National parks reported 333 fires with losses on only 3,369 acres compared with its 10-year average of 18,342 acres. Sport Fisheries and Wildlife had only 55 fires on 1,593 acres.

The Bureau of Indian Affairs reported 1,424 fires, an increase of 50 percent over its 10-year average of

Forestry Employment

Positions Available

Graduate assistant in forest economics, starting July 1, 1959. Must have 2.75 or better point hour rating and aptitude for economics. Remuneration $2,000 per year. Work would primarily be in pricing of forest products and in Christmas tree marketing. Approximately five quarters required to obtain degree.
Write Dr. Mervin G. Smith, Dept. of Agricultural Economics and Rural Sociology, Ohio State University, Columbus 10, Ohio.

ASSISTANT WOODLANDS DIVISION MANAGER for pulp and paper company with 150,000 acres of timberland, which will build a 500-ton per day average kraft pulp and linerboard mill to be located at Counce, Tennessee on the Tennessee River, with excellent opportunity for future growth and expansion. Among qualifications required are: graduate forester; 10-20 years of experience in various departments in a Woodland Division in the southern pulp and paper industry; imagination and initiative and good understanding of dealing with the public. To be in complete charge of wood procurement and act in overall assistant capacity to the manager of the Woodlands Division. Position has excellent opportunities for growth in future. Only well qualified applicants will be considered. Applications will be treated confidential.
Apply: Tennessee River Pulp & Paper Co., 230 Park Avenue, New York 17, N. Y.

Positions Wanted

Forester. B.S.F., 1955, Purdue. One semester graduate work Univ. of Fla. Age 25, single. Experience: traveled 15 months for wood preserving firm; supervised crews of 3 to 9 men, inspected and chemically treated all types of wood, reforestation, timber marking, public relations, and administrative work. 2 years surveyor, draftsman, radio operator Army Corps of Engineers. Interested in all phases of forestry.
Box O, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., 1950, M.F., 1951. Age 31, married, two children. Desire position with responsibility and opportunity. 8 years professional forestry experience; presently employed as assistant forester in charge of management on 60,000 acres of intensively managed southern woodlands.
Box Q, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., Holland, 1944; M.F., Duke Univ., 1952. Age 36, married, one child. Thoroughly qualified in timber and land management, cruising surveys, acquisition appraising, aerial photography, timber sales, operational planning, and public relations (four years in Southeast USA). Presently employed as research forester-phytopathologist with rubber company in Far East. Desire permanent employment, in USA (preferably West Coast) or abroad.
Box R, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., 1954, Iowa State College. Age 27, married, two children. Experienced in all phases of timber management, timber management planning, inventory, economics, aerial photo interpretation and mapping. Some surveying. 3 years experience in timber management with public agency. Desire permanent position with consulting forestry firm.
Box S, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., 1950, Pa., State. Age 34, married, one child. WW II and Korean service. Experience: 3 years as soil scientist with SCS. Soil identification, mapping, drainage, photogrammetry, construction. 3 years in wholesale plywood and flush veneered door sales, buying and estimating. Desire field position in general forestry or park administration. Will relocate. Prefer Penna., and New England states.
Box T, Journal of Forestry, Mills Building, Washington 6, D. C.

Industrial forester. Age 33, married, family. Graduate utilization major. Now employed southwestern United States. Desires change to company that offers advancement possibilities. Experience: 2 years sawmill, 4 years cutup and remfg. plant, 2 years sales and administration—all with same company. Has handled timber cruising, timber sales, log scaling, lumber grading and tallying, and equipment operation and maintenance.
Box U, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, M.F., Yale. Age 31, married, 3 children. Eight years experience in general forest management, public relations, procurement.
Box V, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., & B.S.F., 1957, Univ. of Michigan. 5 months southern pine inventory and mapping prior to army service. Single, age 25. Training included photo interpretation, lumber production, valuation, water resource management and recreation. Personal study included range management, wildlife, and game management. Desire affiliation with progressive company in North or West.
Box W, Journal of Forestry, Mills Building, Washington 6, D. C.

972. Over half these fires were caused by lightning. The 1958 acreage loss was 163,206 compared to 67,093 for their 10-year average.

The Bureau of Land Management reported 1,678 fires compared to a 10-year average of 1,022. Fire losses were held to 688,074 acres, well below their 10-year average of 1,100,640 acres. More effective control in Alaska resulted in this reduction.

Greeley Nursery Marks Production Milestone

The Industrial Forestry Association announces that the 100 millionth seedling from the Col. W. B. Greeley Forest Nursery, Nisqually, Wash., was planted this spring on lands of the St. Paul & Tacoma Lumber Co.

The nursery, started in 1941 to produce 5 million trees a year, is now producing more than 10 million annually.

Alan Malcolm, who at 17 planted one of the nursery's first trees in 1944 on St. Paul and Tacoma's land, planted the 100 millionth tree. Present at the planting ceremony were H. O. Puhn IFA president, E. G. Griggs II, president of St. Paul and Tacoma Lumber Co., and Norman G. Jacobson, retired company forester.

Federation of Canadian Provincial Associations Announced

All the provincial forestry associations supported by the public were welded into one national federation at the annual meeting of the Canadian Forestry Association held at Ottawa March 31. "In this way, we have united in one great, national group," CFA president B. F. Avery told the meeting, "all those interested in the maintenance and development of the coast-to-coast, public service forestry program of the Association which is aimed at maintaining and expanding our leading national resources."

Under the federation the provincial forestry associations retain their autonomy; but they will direct CFA and speak with a united voice through it.

The national association has recognized for some time, said Mr. Avery, that a re-grouping of the provincial forestry associations was essential if funds contributed by the public were to be employed with increasing effectiveness.

The Canadian Forestry Association was launched in the spring of 1900. It was concerned primarily with prevention of the tremendous forest fires which devastated the country at that time.

The association now provides public information on Canada's resources through press, radio, magazines, bulletins, posters, lecture tours, and public addresses. It uses television and other modern means of reaching the public. In addition to the small cash budget of the Association, said Mr. Avery, enormous amounts of contributed time, services, and materials are donated by organizations including the press, radio, and television, thus greatly aiding the development of a conservation consciousness in the Canadian public.

Industrial & Private

John Callaghan to California Forest Protective Association

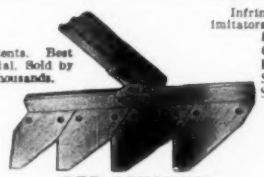
John Callaghan of Sacramento, Calif., former deputy state forester and career officer of the California Division of Forestry, has been named assistant secretary of the California Forest Protective Association. In his new position he will be associated with William Schofield of San Francisco who has been secretary of the organization for the past 16 years.

Mr. Callaghan, a 1937 graduate of the University of California School of Forestry, is general chairman of the 1959 annual meeting of the Society of American Foresters to be held in San Francisco November 15-18.

Named to Positions in Continental Can's Woodlands Division

Theodore W. Earle, general manager of Continental Can Company's newly formed Woodlands Division, has announced the appointment of Louis F. Kalmar as assistant to the general manager and Arthur J. Powers as control officer and chief accountant for the division.

Mr. Kalmar had previously held the position of engineering and development forester when the Woodlands



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West Virginia Pulp and Paper Forester Promoted

J. J. Wiley, Jr., who has been headquartered in Summerville, S. C., since 1956 as coordinator of timber management for the company, has been appointed director of forest research and development. He is succeeding Peter Lannan, director of forest research since 1952 and formerly manager of the Westvaco Experimental Forest near Georgetown, who is resigning from the company.

In addition to directing the company's forest research and development program, Wiley will continue his timber management activities, working in an advisory capacity with the forest managers and as a member of the staff of the manager of the Timberlands Division in New York.

Wiley is a graduate of the New York State Ranger School at Wanakena, N. Y., and holds a B.S. degree in forestry from the University of Michigan School of Forestry and Conservation.

He became a forester with the company in 1942.

Allied

J. H. Kitchens Leaves Post with Louisiana Forestry Association

J. H. Kitchens, Jr., executive director of the Louisiana Forestry Association, leaves his post June 1 to enter private employment with the Forestry Division of T. L. James & Co. in Ruston. The announcement was made recently by the association's executive committee, according to Vertrees Young, president.

J. H. KITCHENS

Kitchens will assist Don Burkhalter in directing the James Company's reforestation program throughout Louisiana.

Kitchens was named executive secretary of the Louisiana Forestry Association in April 1951, after having served 11 years as chief of information and education for the Louisiana Forestry Commission. Prior to that time, he was employed by the Tennessee Valley Authority and Soil Conservation Service in forestry education and public relations work. He received his forestry degree from Louisiana State University in 1937.

FPRS to Hold 13th National Meeting

The 13th National Meeting of the Forest Products Research Society will be held in San Francisco June 28-July 3.

The theme of the meeting is "Research for Profit" and will deal with the economic implications of research results. The entire meeting is under the joint direction of Dr. E. S. Harrar, dean, School of Forestry, Duke University, Durham, N. C., and Raymond H. Berry, vice president and general manager, Scott Lumber Company, Burney, Calif.

In addition to technical sessions, a variety of plant trips will include such organizations as Fibreboard Products Corporation, Antioch, Calif.; California Forest Products Laboratory, Richmond; Union Lumber Company, Fort Bragg; Masonite Corporation, Ukiah; and the new Diamond Gardner Corporation mill at Red Bluff.

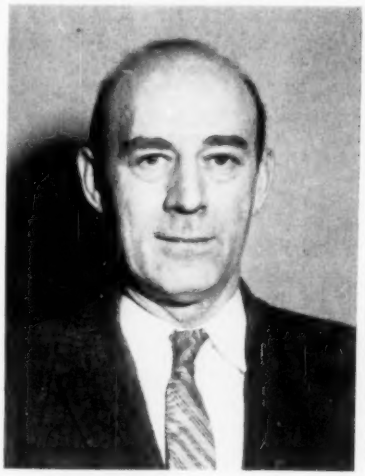
Directs Georgia Research Council

H. E. Ruark of Jacksonville, Fla., land acquisition manager of Owens-Illinois Glass Co., was recently named director of the Georgia Forest Research Council.

Ruark will help coordinate and initiate forest research in Georgia by state, federal, and private agencies.

A graduate of the University of Georgia School of Forestry, Ruark served in the European theater in World War II and was awarded the Bronze Star. Upon discharge, he was associated with the Haws-Hardin Lumber Co. and Carolina Foresters, Inc., in Walterboro, S. C. In 1950, he joined the Georgia Forestry Commission as fire control chief, and served until February 1957, when he joined Owens-Illinois.

Public



DAVID R. GIBNEY

Supervisor of Willamette Named

David R. Gibney has been selected to become the new forest supervisor of the Willamette National Forest in Oregon, according to an announcement by Regional Forester J. Herbert Stone of the U. S. Forest Service. Gibney's promotion and transfer fill the vacancy left by the death of Robert Aufderheide, supervisor for the past five years.

Gibney started working for the Forest Service in 1933. Until 1941 he worked in the North Central Region. From 1945 on he has been in the Pacific Northwest Region. For the past four years he has been a staff assistant in the Division of Timber Management, logging engineering section, in the Pacific Northwest Regional Headquarters at Portland.

A native of Minnesota, he received a Bachelor of Science in Forestry degree from the University of Minnesota in 1933.

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Recreational Use Plans for BLM Lands Drawn Up

Secretary of Interior Seaton has approved a policy statement by the Bureau of Land Management which provides for recreational development of BLM lands. The policy makes suitable sites available to states or local agencies. It is based upon the Taylor Grazing Act and the Recreation and Public Purpose Act. Special provisions are made for Western Oregon O&C lands for which BLM has specific authority to provide recreational facilities and is now working out a program with the counties involved.

Joins Forest Insect Laboratory Staff

ARTHUR D. MOORE

Arthur D. Moore, forest entomologist, reported to the Forest Insect Laboratory, U. S. Forest Service, Beltsville, Md., on January 5 to head a project on aerial spraying studies.

Before joining the Forest Service, Dr. Moore was an assistant professor of entomology at the University of California at Berkeley where he helped develop a research and graduate teaching program in forest entomology. Prior to his teaching and research work at the university, Dr. Moore was employed as research entomologist by the Pacific Northwest Forest and Range Experiment Station.

Moore graduated from New York State College of Forestry with a B.S. degree in 1949 and an M.S. in 1950. He received his Ph.D. in 1956 from the University of California. He fills a vacancy resulting from the death of J. M. Davis in December 1957.

Forest Service Film Wins Award

A new U. S. Forest Service film, "Watershed Wildfire," was awarded top honors in the category Agriculture, Conservation and National Resources by the Educational Film Library Association at its recent American Film Festival, held in New York.

The film shows how devastating a fire can be to watershed lands and illustrates steps in rehabilitation.

Clint Davis, Forest Service I&F chief, was on the spot in 1955 when a fire broke out in the Los Padres National Forest, watershed for the Santa Barbara area, California. According to a Department of Agriculture news release, Davis "borrowed a camera, flew over the fire in a helicopter, and filmed in color some of the most spectacular fire footage ever photographed."

Subsequently, a department photographic team filmed scenes of aerial reseeding of the burned-over area and of other rehabilitation work.

The film is available for general circulation from regional offices of the Forest Service and from the Office of Information, U. S. Department of Agriculture, Washington 25, D. C.

Fifth Annual Central Sierra Forest Fire Conference

With an attendance of one hundred foresters and fire control specialists, the fifth annual Central Sierra Forest Fire Conference was held at Lake Tahoe, Calif., April 20-22.

The conference is an interagency gathering with representation from twenty different bureaus of state and federal government in California and Nevada. Its purpose is to discuss new techniques in fire prevention and control and to promote liaison between the several fire forces.

Guerdon Ellis, supervisor of the El Dorado National Forest, was host to the conference. Allen H. Mullen was general chairman.

Among the speakers were Francis Raymond, state forester, California Division of Forestry, and William C. Branch, assistant regional forester in

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charge of state and private cooperation for the U. S. Forest Service. Henry Clepper represented the Society of American Foresters.

Wayne Hubbard, Keep California Green, Inc., was moderator of a panel discussion on improved fire prevention. Other topics had to do with law enforcement, civil defense in fire control, aerial techniques of fire attack, and preventive action in aircraft accidents.

Fire control equipment and communication systems were exhibited under the supervision of Everett Fox.

Moves to Portland Post

Russell P. McRorey will be transferred to the Regional Office of the U. S. Forest Service Pacific Northwest Region, headquarters in Portland, Ore., effective July 12, according to an announcement by Regional Forester J. Herbert Stone. McRorey will move to Portland from the California Region and will assume the newly established position of deputy chief of the Division of Timber Management. The Pacific Northwest Region sells approximately 3 billion board feet of timber each year.

McRorey graduated from the University of California in 1936 with a degree in forestry.

He started to work for the Forest Service in 1936 as a technician in timber management in the California Region. During the past four years, he has been supervisor of the Stanislaus National Forest with headquarters at Sonora, Calif.

NW Forest Survey Chief Selected

Selection of Melvin E. Metcalf to head up the federal forest survey program in Oregon and Washington was announced in April by Robert W. Cowlin, director of the Pacific Northwest Forest and Range Experiment Station, U. S. Forest Service.

Metcalf transferred from the Intermountain Forest and Range Experiment Station at Ogden, Utah, where he was a project leader and field supervisor of forest survey work since 1951. He began his new duties in Portland on May 18.

Metcalf started his career with the Forest Service in 1937. He worked in the Northern Rocky Mountain Region of the Forest Service until 1942, when he entered the U. S. Navy. He served as submarine torpedoman throughout the war and returned to the Forest Service late in 1945. He is a graduate in forestry from Montana State University.

Schools

Montana State to Introduce High School Students to Forestry Training

Forty Montana high school boys will have an opportunity this summer to test their scientific interest and aptitude in a training program administered by the Montana State University School of Forestry and supported by a National Science Foundation grant of $4,730, Dean Ross Williams of the School of Forestry has announced.

The NSF grant will enable the School of Forestry to put into operation a plan designed to stimulate interest in science among high school students and acquaint them with career opportunities in the natural-science based fields of forestry, range management, wildlife management, soil and water conservation, watershed management, forest recreation, and wood utilization.

The program will be carried out in two sessions, conducted at the university's Lubrecht Forest and directed by Arnold W. Bolle, associate professor of forestry at Montana State. The first session will run from June 22 to July 1, and the second from July 13 to July 22. Twenty high school students in their junior and senior years will be selected for each 10-day session. Five students from each group of 20 will be chosen to continue training in a special 10-day period extending beyond the regular sessions.

The course of study, designed to introduce students to the natural resources fields, will be prepared by regular staff members of the School of Forestry. They will be aided by visiting staff and consultants.

Stark to Direct Beetle Research at California

Ronald William Stark, formerly agricultural research officer and associate forest biologist with the Division of Forest Biology, Canada Department of Agriculture, has been appointed assistant professor and assistant forest entomologist at the University of California, Berkeley.

He succeeds Arthur D. Moore, who resigned to accept an administrative position with the U. S. Department of Agriculture.

Stark was born in Calgary, Alberta, and attended the University of Toronto where he received the bachelor's degree in forestry and the master's degree in entomology. Last year, he completed studies for the Ph.D. degree in forest entomology at the University of British Columbia. He is currently serving a second term as chairman of the Western Forest Insect Work Conference.

At Berkeley, Stark is teaching a course in forest entomology in addition to directing studies.

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LSU Adds Three to Staff

Three new faculty members have been appointed to the Louisiana State University School of Forestry, Baton Rouge.

Warren S. Thompson was appointed assistant professor of forestry and will teach courses in wood technology and dendrology. Thompson has been a research worker with the Mississippi State Agricultural Experiment Station and the Masonite Corp. He received B.S. and M.S. degrees from Alabama Polytechnic Institute.

R. Rodney Foil is an instructor in forestry for the spring and summer terms. He teaches courses in dendrology, silviculture, artificial reforestation, and mensuration. He was formerly an employee of the Union Bag-Camp Paper Corp., and was graduated from the LSU School of Forestry.

Dr. M. S. Czarnowski, a visiting scientist from Poland, received a temporary appointment to the LSU research staff. He is on leave from a position as a research worker in the Polish Forestry Research Institute in Krakow.

Dr. Czarnowski will investigate mathematical relationships between southern pine stand characteristics. He is the author of 32 technical forestry publications and received a doctorate in forestry at the University of Poznan.

Southern Illinois Announces Staff Additions

Ronald I. Beazley has been named professor of forestry at Southern Illinois University. He will teach and do research work in forest economics beginning in August.

A native of Halifax, Nova Scotia, Beazley received his bachelor's degree from the University of New Brunswick, his master's from Yale, and the doctorate from Purdue. He has had experience with Canadian paper and plywoods companies and as a forest economist in the Canadian Federal Forestry Branch. For the last six years he has been on the staff of the School of Forestry, University of Minnesota.

C. Edward Behre, former director of the Northeastern Forest Experiment Station and later a staff assistant in the Forest Service Washington office, has been teaching at Southern Illinois as a visiting professor during the winter and spring quarters.

James F. Dubuar, retired director of the New York State Ranger School, is director of the sophomore spring camp with headquarters at Giant City State Park.

Missouri Alumni Honor M. W. Talbot

A certificate of merit for "outstanding achievement and meritorious service" in forestry was recently presented by the University of Missouri Alumni Association to Murrell Williams Talbot. The citation was presented at the spring dinner of the university's Forestry Club.

Talbot graduated in forestry from Missouri University in 1913. He retired from the U. S. Forest Service in 1955 after a 42-year career in which he worked chiefly on range research. He held assignments in the Southwest and was associate director of the California Forest and Range Experiment Station from 1946 until retirement. Subsequently he has served as a consultant in forest range management to the Government of Spain and in watershed management for the Charles Lathrop Pack Forestry Foundation.

Forest Pathology Index Moves to Iowa State

The Boyce Index of World Forest Pathology Literature has been moved to Iowa State College where it will be placed under the supervision of Dr. H. S. McNabb, Jr., associate professor of botany and plant pathology, and forestry.

Dr. John Shaw Boyce, now professor emeritus at Yale University, started the index in 1908. At present it has 41,868 references, and is consulted by scholars from all parts of the world.

During the transfer it is being reproduced and made available to 13 other institutions in the United States and Canada. McNabb will keep the index up to date, and will send current references to these institutions and to eight others who have become subscribers. He will add about 1,500 references per year by checking all journals and other publications in the field.

Fifty-Seven Study Log Grading at Idaho

On April 8-10, 57 men participated in a Log Grading Conference held by the College of Forestry on the University of Idaho campus at Moscow. Representatives of industry, state and federal agencies, and educational institutions attended from California, Oregon, Washington, British Columbia, Montana, Utah, and Idaho.

Instructors represented the Forest Service, Western Pine Association, Washington State University, private companies, and the University of Idaho.

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